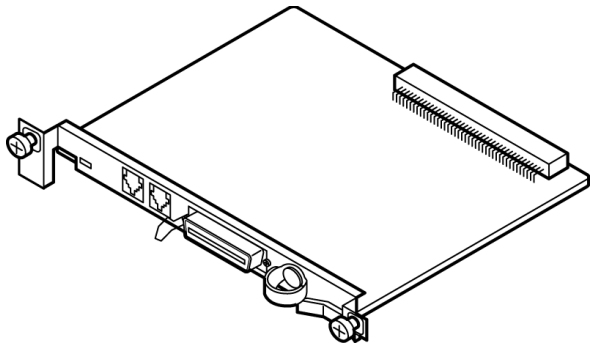
ORDER NO. KMS0510135CE

Service Manual

16-Port Single Line Telephone Extension Card

KX-TDA6174XJ
KX-TDA6174X

(for Europe, Asia Oceania, Middle Near East, Latin America, Russia and Africa)



⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

When you note the serial number, write down all of the 11 digits. The serial number may be found on the unit.

IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING

If lead free solder was used in the manufacture of this product the printed circuit boards will be marked PbF.

Standard leaded, (Pb), solder can be used as usual on boards without the PbF mark.

When this mark does appear please read and follow the special instructions described in this manual on the use of PbF and how it might be permissible to use Pb solder during service and repair work.

Panasonic

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1 ABOUT LEAD FREE SOLDER (PbF: Pb free)

Note:

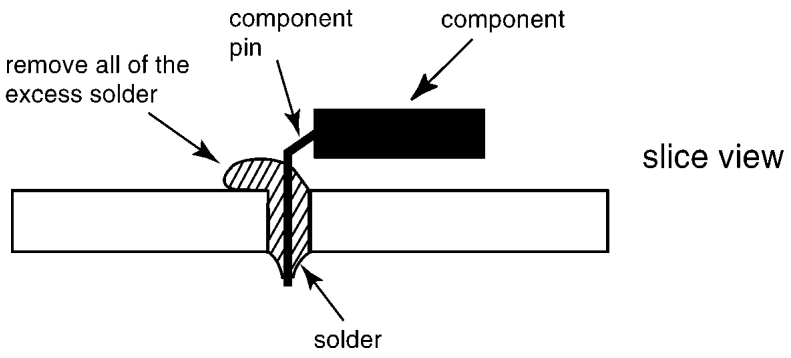
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

We will use PbF when discussing the lead free solder used in our manufacturing process which is made from Tin, (Sn), Silver, (Ag), and Copper, (Cu).

This model, and others like it, manufactured using lead free solder will have PbF stamped on the PCB. For service and repair work we suggest using the same type of solder although, with some precautions, standard Pb solder can also be used.

Caution

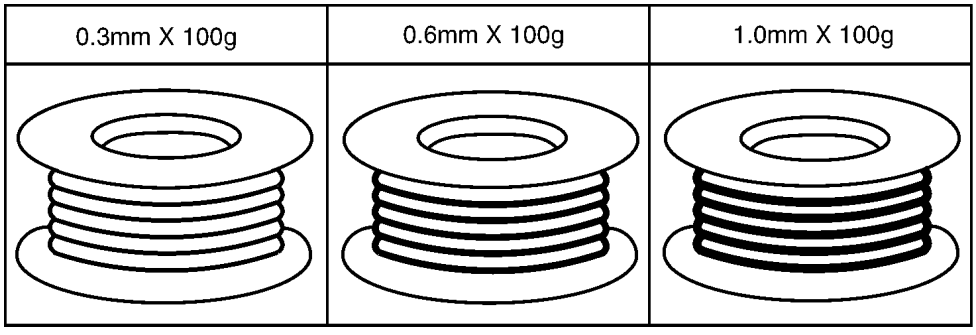
- PbF solder has a melting point that is 50° ~ 70° F, (30° ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700° ± 20° F, (370° ± 10°C). In case of using high temperature soldering iron, please be careful not to heat too long.
- PbF solder will tend to splash if it is heated much higher than its melting point, approximately 1100°F, (600°C).
- If you must use Pb solder on a PCB manufactured using PbF solder, remove as much of the original PbF solder as possible and be sure that any remaining is melted prior to applying the Pb solder.
- When applying PbF solder to double layered boards, please check the component side for excess which may flow onto the opposite side (See figure, below).



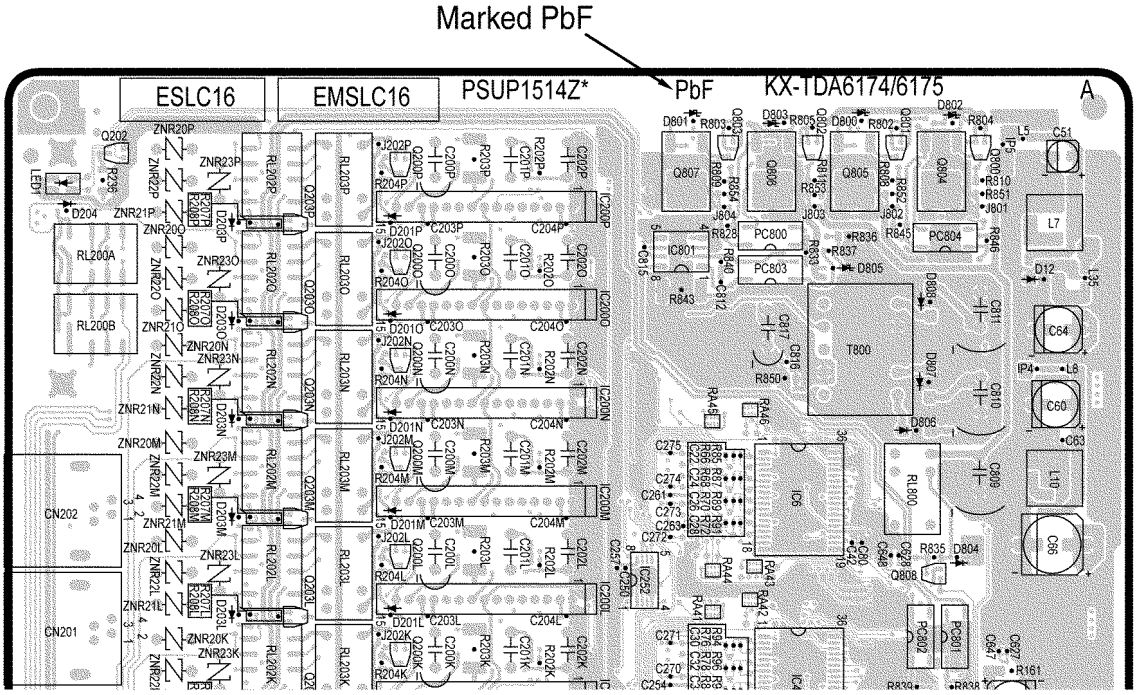
1.1. SUGGESTED PbF SOLDER

There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper, (Sn+Ag+Cu), you can also use Tin and Copper, (Sn+Cu), or Tin, Zinc, and Bismuth, (Sn+Zn+Bi). Please check the manufac turer's specific instructions for the melting points of their products and any precautions for using their product with other materials.

The following lead free (PbF) solder wire sizes are recommended for service of this product: 0.3mm, 0.6mm and 1.0mm.



1.2. HOW TO RECOGNIZE THAT Pb FREE SOLDER IS USED



ESLC16 BOARD COMPONENT VIEW

2 FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.

When repairing, the following precautions will help prevent recurring malfunctions.

1. Cover the plastic parts boxes with aluminum foil.
2. Ground the soldering irons.
3. Use a conductive mat on the worktable.
4. Do not touch IC or LSI pins with bare fingers.

3 GENERAL DESCRIPTION

This card is plugged into a free slot on the TDA600 systems and randomly connects up to 16 SLT devices.

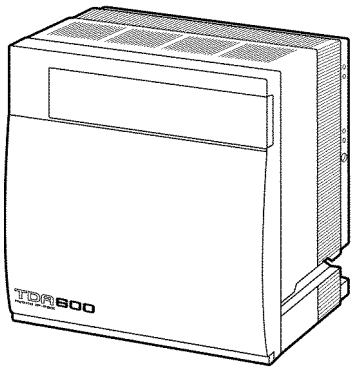
The LPR is SH-1(SH7020), and the memory is composed of a 512K byte Flash Rom and a 128K byte SRAM.

It also supports a software upgrade by downloading the latest version.

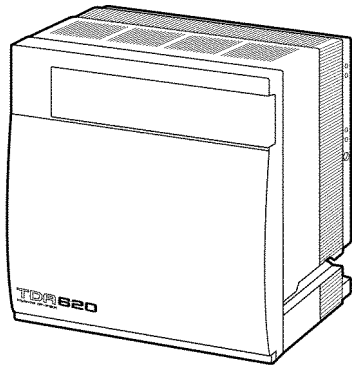
4 SPECIFICATION

Functional Block	Functional contents	
Extension Interface	Number of Ports	16 ports
	SLT Interface	+30V 30mA Feeding function Dial-pulse signal detecting function DTMF signal detecting function Bell signal issuing function Hook detecting function Ringtrip detecting function 2W/4W converting function Surge protective function 4ch CODEC function • CODEC function • Power down function • μ/A law switching function • Test function (Loop back, Tone generation) • Programmable digital filtering function • Serial interface function • PIO function
DTMF Receiver	16 lines for each port	
On-board Ringer	20/25Hz 75Vrms Phase control (Three-phase / Four-phase)	
On-board DC/DC Power Supply	Input +15V Output +5V, +3.3V Input +40V Output for Bell ringing relay: +160V, -100V	
Power Failure Forwarding Function	4 lines supported	
Self-Diagnostic Function	Carried out with outside-line interface in a pair (only one port) Speech path test, Dial pulse test, DTMF test	
ASIC	EC bus interface function H.100 bus interface function, Digital PLL function Local bus interface function Time switch function, Gain controlling function, FIFO/DPRAM function Designated telephone control interface function (HDLC included) Intelligent PIO function	
Control Unit	CPU	SH-1/SH7020 (12.288MHz)
	Flash ROM	512Kbyte
	SRAM	128Kbyte
LED Display Circuit	Card status indicating LED: Two colors (Red/Green)	
External Interface Connector	Extension interface	50pin Amphenol connector: 1
	Power failure forwarding	4pin modular jack: 2

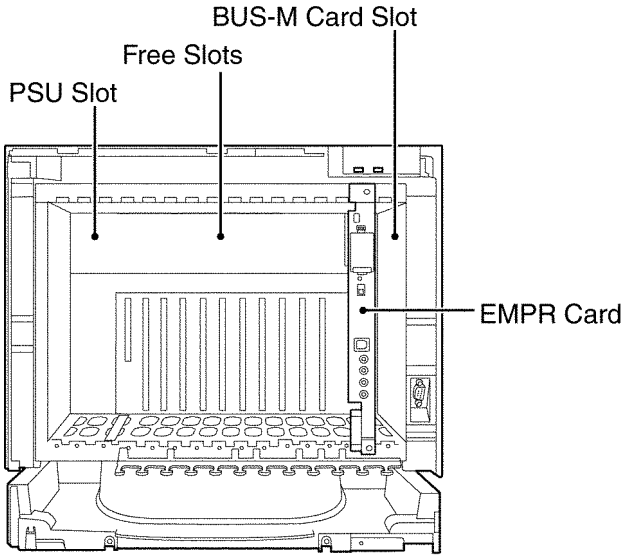
5 SYSTEM CONSTRUCTION



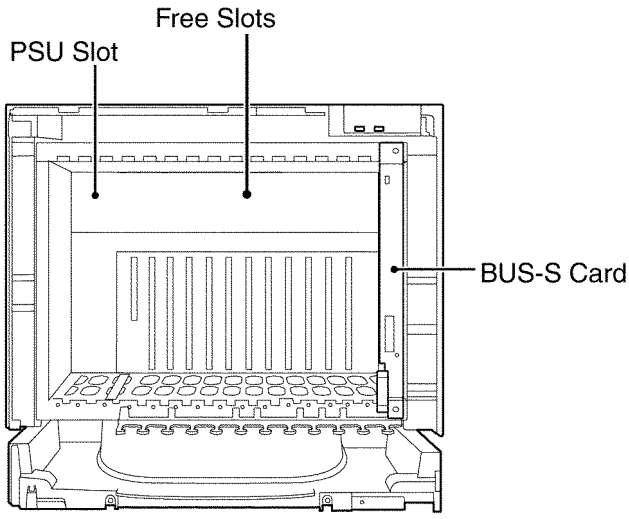
Basic Shelf
(KX-TDA600)



Expansion Shelf
(KX-TDA620)



Basic Shelf
(KX-TDA600)



Expansion Shelf
(KX-TDA620)

5.1. INSTALLING/REMOVING THE OPTIONAL SERVICE CARDS

Slot Condition

Card Type	Slot Type				
	KX-TDA600			KX-TDA620	
	Free 1-10	EMPR	BUS-M	Free 1-11	BUS-S
EMPR Card	No	Yes	No	No	No
BUS-M Card	No	No	Yes	No	No
BUS-S Card	No	No	No	No	Yes
Trunk Cards	Yes	No	No	Yes	No
Extension Cards	Yes	No	No	Yes	No
OPB3 Card	Yes	No	No	Yes	No
CTI-LINK Card	Yes	No	No	No	No
EECHO Card	Yes	No	No	Yes	No

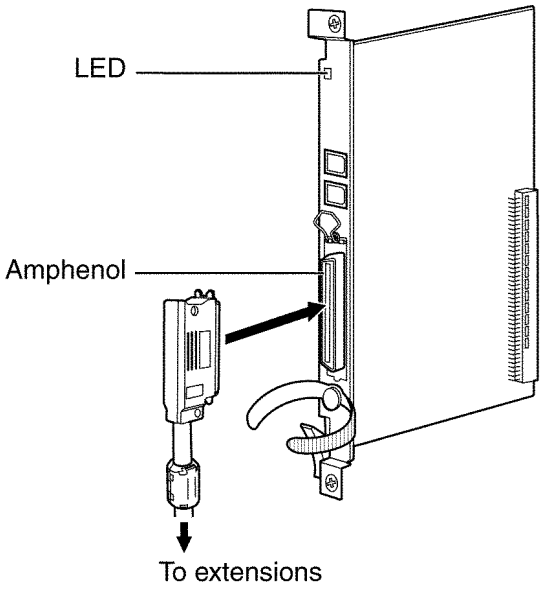
Caution:

To protect the back board from static electricity, do not touch parts on the back board in the main unit and on the optional service cards.To discharge static, touch ground or wear an earthing strap.

ESLC16 Card

Function

16-port extension card for SLTs with 4 power failure transfer (PFT) ports.



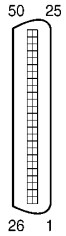
Accessories and User-supplied Items

Accessories (included): Screws X 2, Ferrite core X 1

User-supplied (not included): Amphenol connector

Pin Assignments

Amphenol Connector



No.	Signal Name	Function	No.	Signal Name	Function
1	RA	Ring port 1	26	TA	Tip port 1
2	RB	Ring port 2	27	TB	Tip port 2
3	RC	Ring port 3	28	TC	Tip port 3
4	RD	Ring port 4	29	TD	Tip port 4
5	RE	Ring port 5	30	TE	Tip port 5
6	RF	Ring port 6	31	TF	Tip port 6
7	RG	Ring port 7	32	TG	Tip port 7
8	RH	Ring port 8	33	TH	Tip port 8
9	RI	Ring port 9	34	TI	Tip port 9
10	RJ	Ring port 10	35	TJ	Tip port 10
11	RK	Ring port 11	36	TK	Tip port 11
12	RL	Ring port 12	37	TL	Tip port 12
13	RM	Ring port 13	38	TM	Tip port 13
14	RN	Ring port 14	39	TN	Tip port 14
15	RO	Ring port 15	40	TO	Tip port 15
16	RP	Ring port 16	41	TP	Tip port 16
17-25	Reserved	-	42-50	Reserved	-

LED Indications

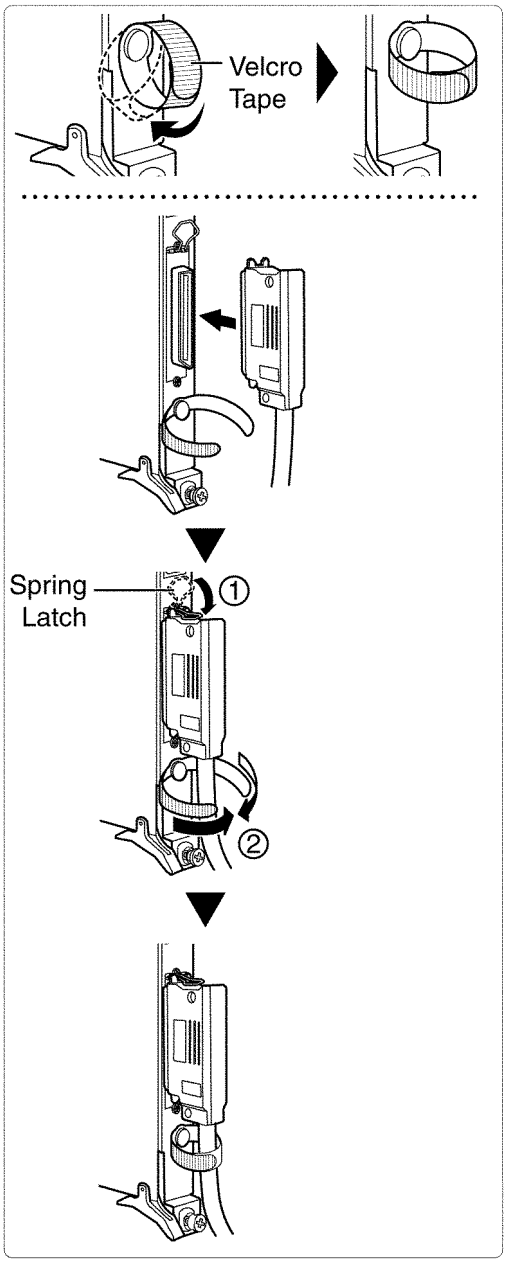
Indication	Color	Description
CARD STATUS	Green/Red	Card status indication OFF: Power Off Green ON: Normal (all ports are idle) Green Flash (60 times per minute): Normal (a port is in use) Red ON: Fault (includes reset) Red Flash (60 times per minute): Out of Service

Fastening Amphenol Connector

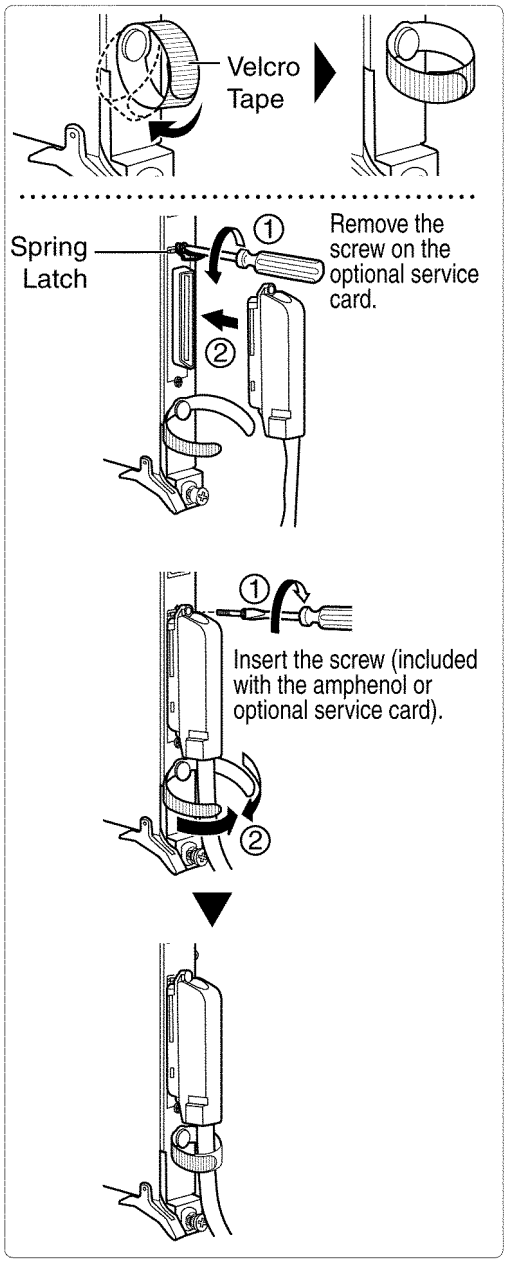
An amphenol 57JE type connector is used on some of the optional sevice cards.

To connect an amphenol connector, use the spring latch or screw to fix the upper part and use Velcro® tape to fix the lower part of the connector.

Type A (Spring Latch + Velcro Tape)



Type B (Screw + Velcro Tape)



Using Analogue Trunk Card and Extension Card

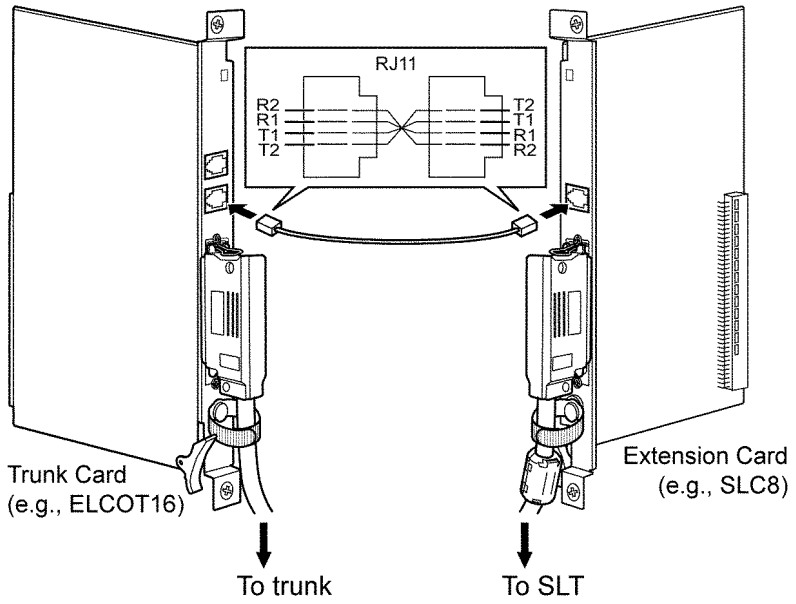
Power Failure Connection connects a specific SLT and a trunk in the event of power failure. The following analogue trunk and extension cards can be used for Power Failure Connections:

- Analogue trunk card: ELCOT16 (4 PFT ports)
- Extension card: EMSLC16 (4 PFT ports), ESLC16 (4 PFT ports), DHLC8 (2 PFT port) and SLC8 (2 PFT port)

To 1 analogue trunk card, connect only 1 extension card.

Note:

- Power Failure Connections must be made within the same shelf.
- By programming the Hybrid IP-PBX, a trunk conversation established during power failure can be maintained even when the power returns and the connection is switched back to the normal maintained even when the power returns and the connection is switched back to the normal performed, the connection will be dropped when power returns.



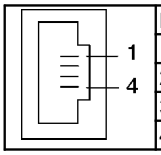
Accessories and User-supplied Items

Accessories (included): none

User-supplied (not included): RJ11 connectors

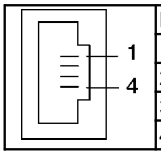
RJ11 Connector Pin Assignments for Analogue Trunk Card

PFT Ports 1 and 2



No.	Signal Name	Function
1	R2	Ring port 2
2	R1	Ring port 1
3	T1	Tip port 1
4	T2	Tip port 2

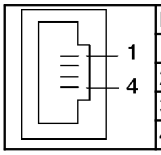
PFT Ports 3 and 4



No.	Signal Name	Function
1	R4	Ring port 4
2	R3	Ring port 3
3	T3	Tip port 3
4	T4	Tip port 4

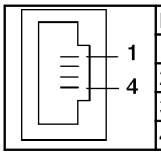
RJ11 Connector Pin Assignments for Extension Card

PFT Ports 1 and 2



No.	Signal Name	Function
1	T2	Tip port 2
2	T1	Tip port 1
3	R1	Ring port 1
4	R2	Ring port 2

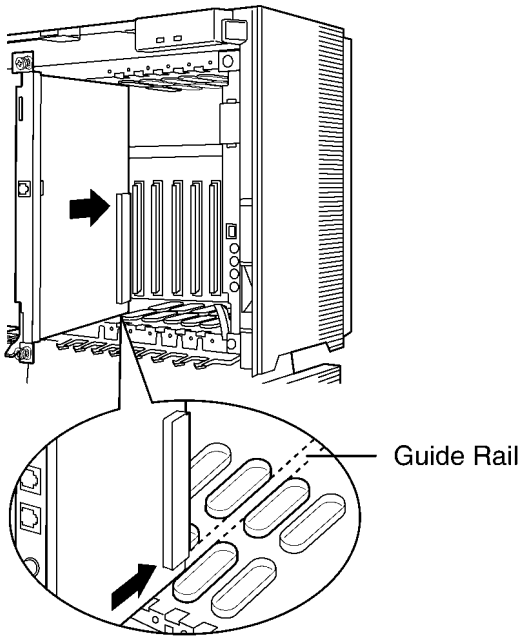
PFT Ports 3 and 4 (for EMSLC16/ESLC16 card only)



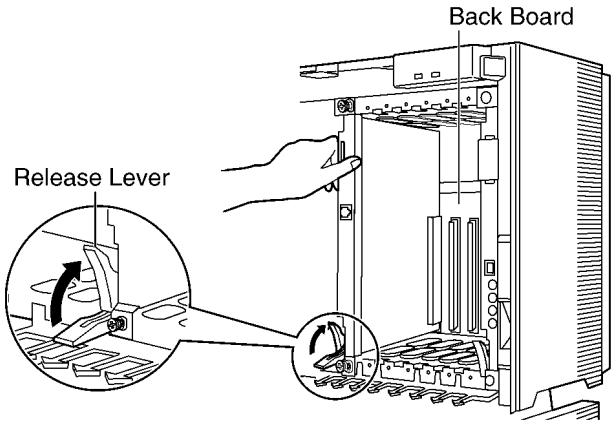
No.	Signal Name	Function
1	T4	Tip port 4
2	T3	Tip port 3
3	R3	Ring port 3
4	R4	Ring port 4

Installing Optional Service Cards

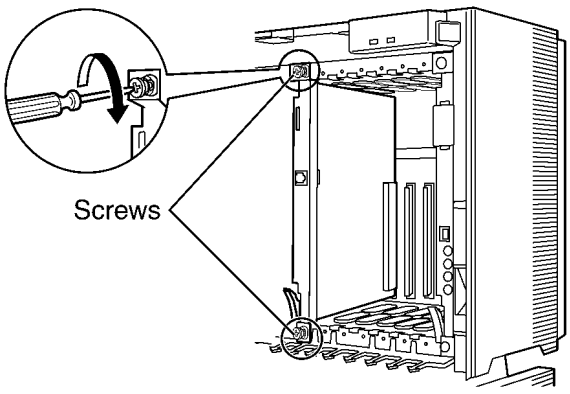
1. Insert the card along the guide rails.



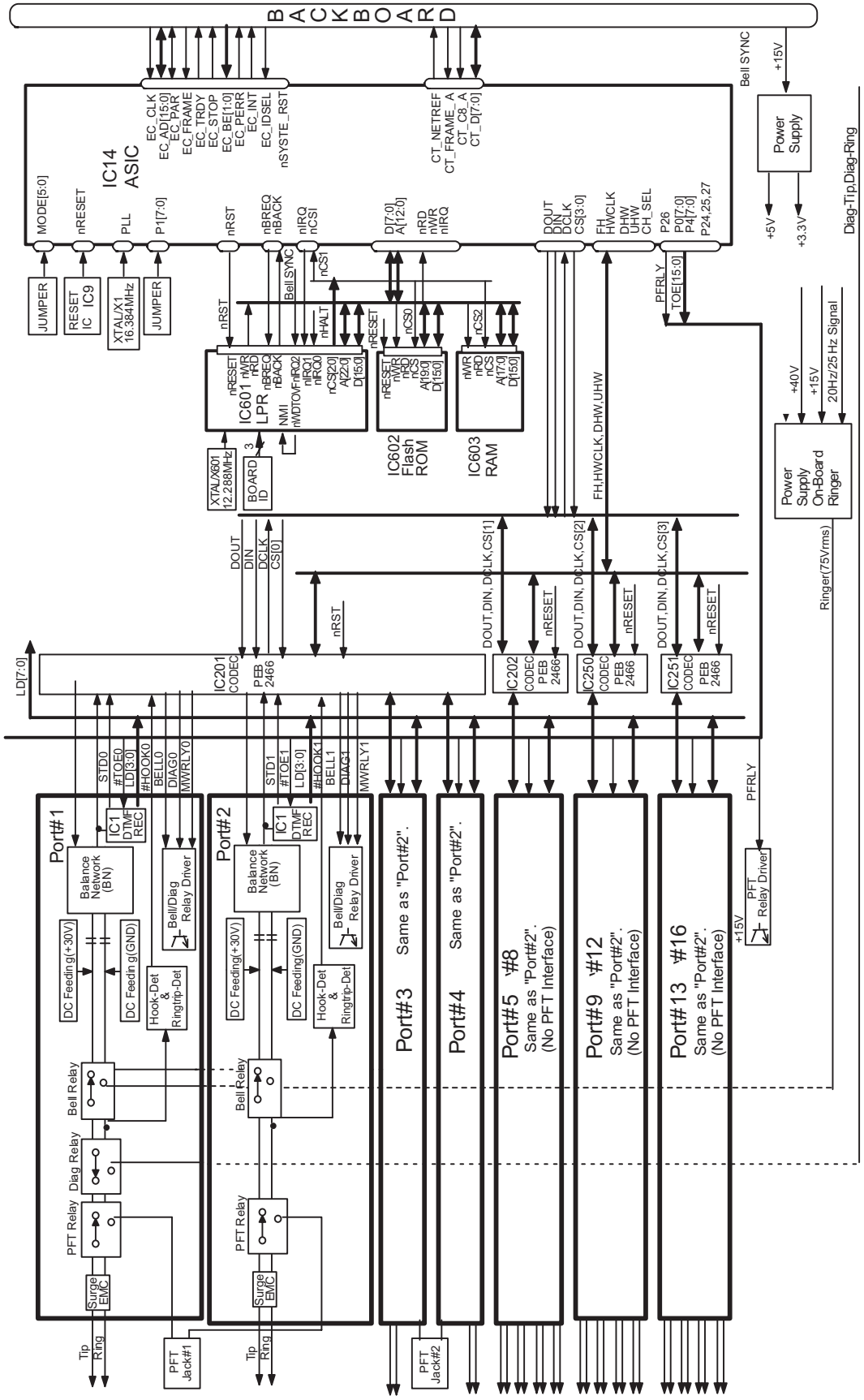
2. Holding the card as follows, push the release lever in the direction of the arrow so that the card is made to engage with the connector on the back board securely.



3. Turn the 2 screws clockwise to fix the card.



6 BLOCK DIAGRAM



KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD BLOCK DIAGRAM

7 CIRCUIT OPERATION

7.1. CONTROL-SYSTEM CIRCUIT

7.1.1. CPU Peripherals

- **CPU (System clock: 12.288 MHz).....IC601**

  Data bus: 16bit, Address bus: 23bit

- **Flash ROM (512Kbyte).....IC602**

  Flash memory consists of two areas: boot space and administration space.

  Administration program can be rewritten through downloading.

0	Sector 0 16KB	Boot (128KB)
4000	Sector 1 8KB	
6000	Sector 2 8KB	
8000	Sector 3 32KB	
10000	Sector 4 64KB	
20000	Sector 5 64KB	Administration (384KB)
30000	Sector 6 64KB	
40000	...	
70000	Sector 10 64KB	

- **SRAM (1Mbit).....IC603**

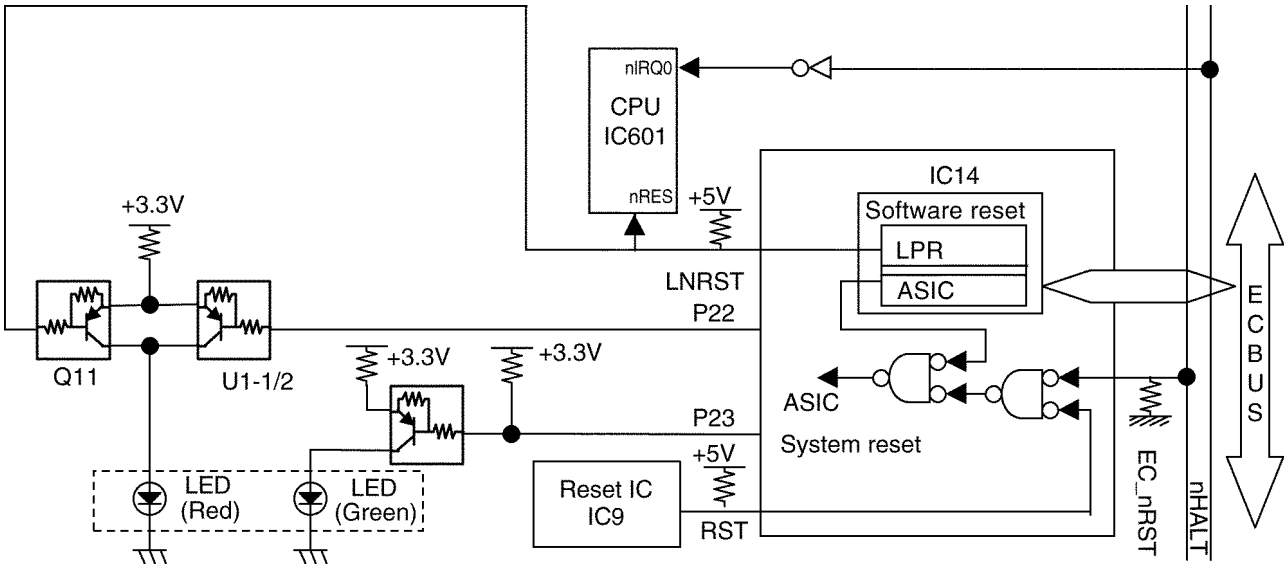
  Used for the data buffer for CPU work area, and PT communication.

- **Reset**

  Resets of an ESLC16 card are roughly classified into the two kinds: ASIC reset and LPR reset.

  After the release of the ASIC reset, the LPR reset is released by the soft reset from the side of the main card and the LPR program is booted.

Type of reset	Reset method		Specification
ASIC reset	ASIC reset is reset under the AND condition of reset signals (negative logic) listed below.		
	Power-on reset	Reset by reset IC	
	Hard reset from the main bus	Reset by EC_RST signal	
	Soft reset from the main bus	Released after the specified time	
LPR reset	Soft reset from the main bus		Low active Reset pulse width: 1.6 microseconds or more



- **LED Operation status indicating LED (Two colors)**

  OFF: Fault

  Red ON: Fault (RESET included)

  Green ON: Normal (Line not in use)

  Green Flash (60/minute): Normal (Line in use)

Orange: OUS (Because OUS needs to be controlled by EMPR, reset terminal and port control terminal are ORed to generate OUS)

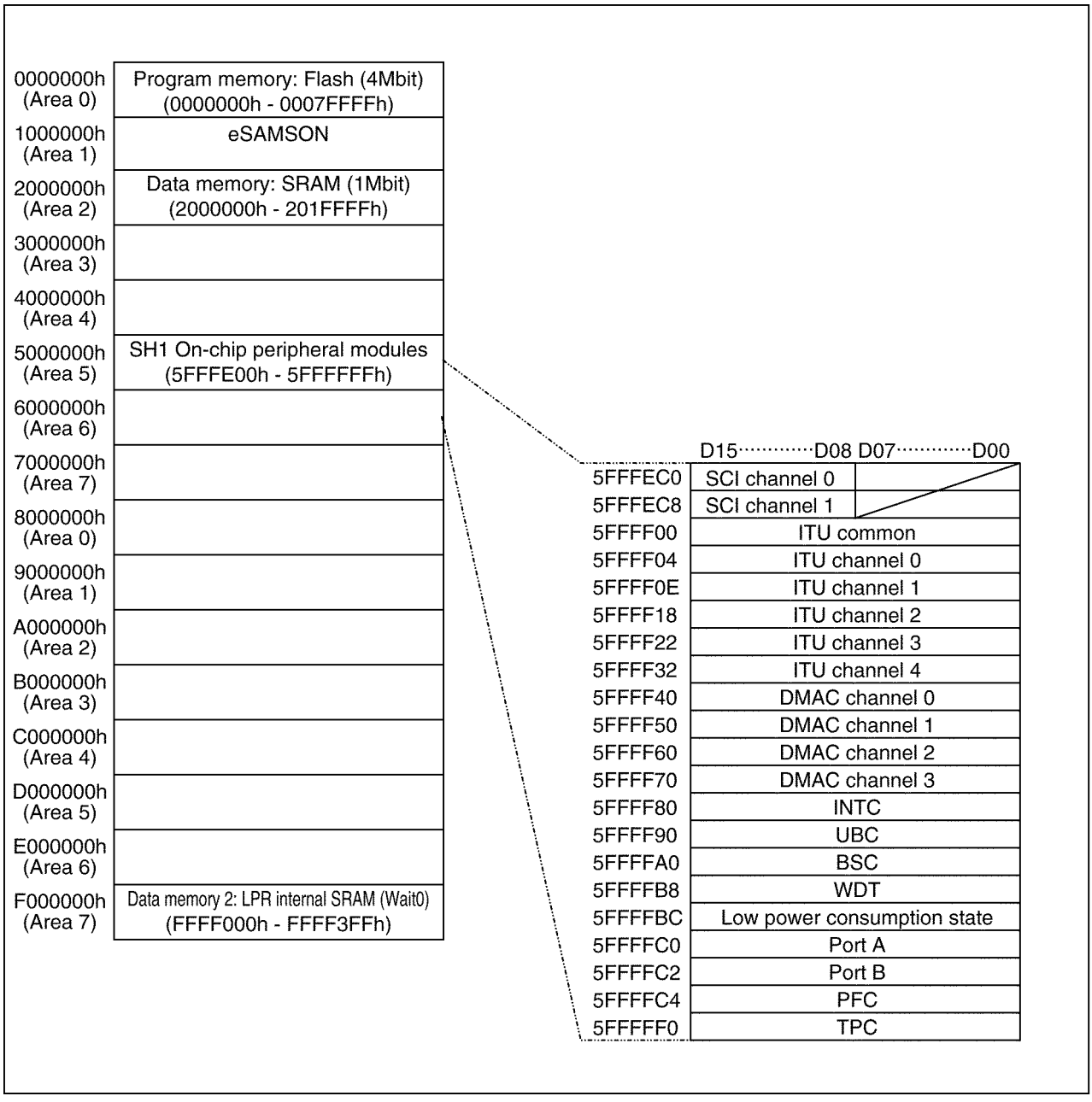
- **Instantaneous power interruption operation**

When instantaneous power interruption is 300msec or less, reset operation is not carried out because the voltage is retained by the capacitor in the power supply.

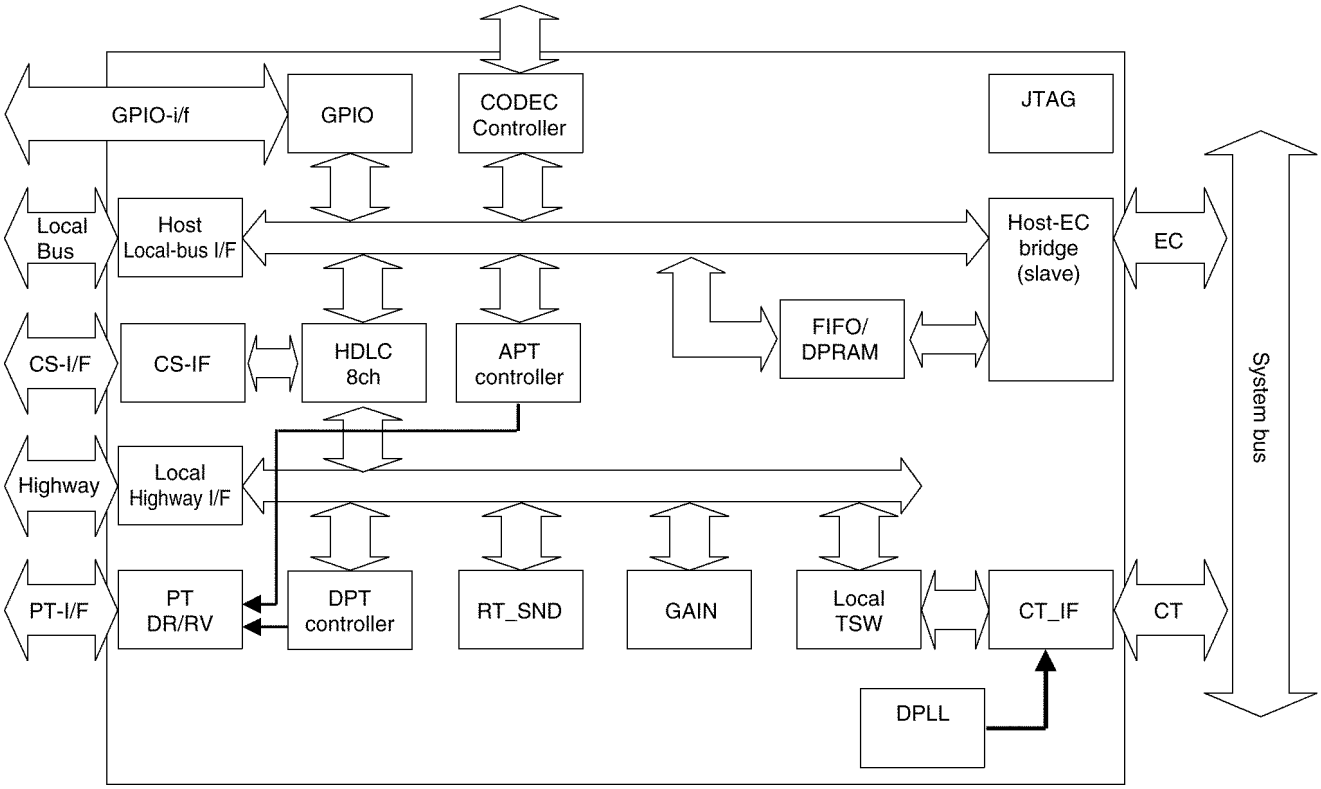
After HALT from EMPR is detected at the DC power down port, CPU goes into the sleep mode by executing the instruction of SLEEP.

At the sleep mode, the CPU/Clock enters the halt state while the contents of the register, the internal RAM, and the I/O port are maintained.

When the instantaneous power interruption is released, HALT is negated, and CPU is recovered to the normal mode by the detection of IRQ0=L



7.1.2. IC14 (ASIC)



- **EC bus interface**

  Independent bus for 16bit/8MHz two-way address data multiplex.

- **CT bus interface**

  Supports eight 8.192MHz highways (128 time slots).

- **Local TSW**

  Exchanges the time slots between CT bus (1024ch) and local highway (64ch).

- **Local highway interface**

  Accommodates 2.048, 4.096, and 8.192MHz highways (Up to 64 time slots).

Slot	PCM data
0-15	Not used
16	SLT#0
17	SLT#1
18	SLT#2
19	SLT#3
20	SLT#4
21	SLT#5
22	SLT#6
23	SLT#7
25-31	Not used

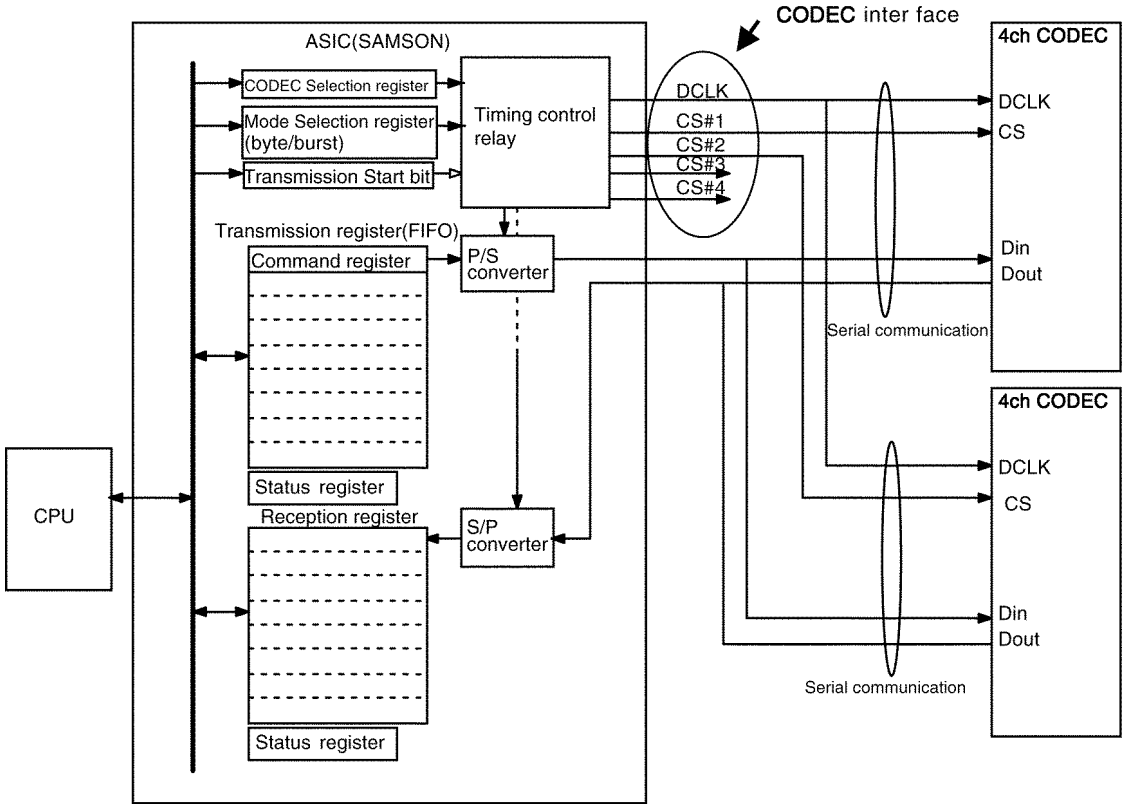
Slot	PCM data
32-47	Not used
48	SLT#8
49	SLT#9
50	SLT#10
51	SLT#11
52	SLT#12
53	SLT#13
54	SLT#14
55	SLT#15
56-63	Not used

- **Local gain control**

  Controls the gain of the local highway up-and-down 64ch in 1db step arbitrarily.

- **CODEC interface**

  Can connect up to four Infineon-manufactured PEB2466, and is intended for enabling the line control.

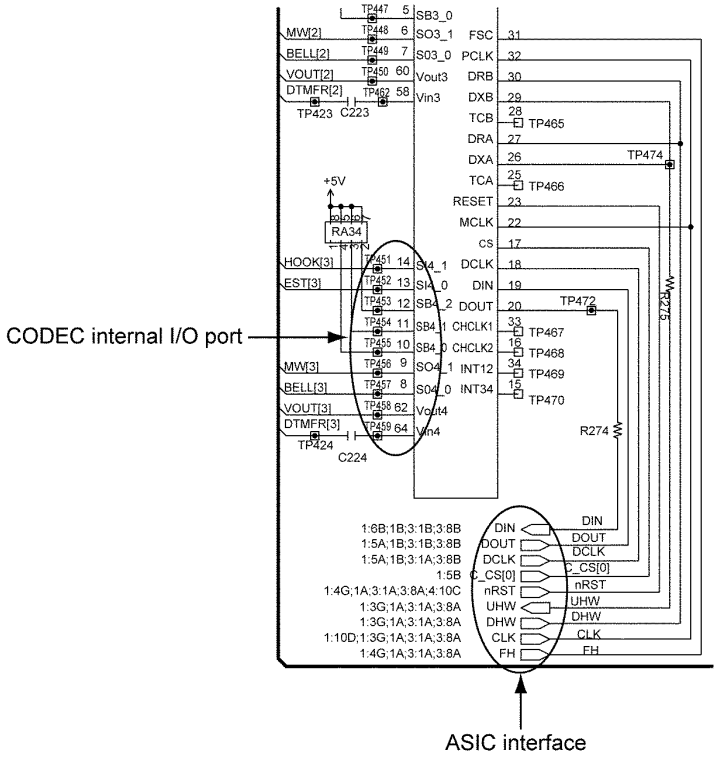


- **GPIO interface**

  Parallel interface that is arbitrarily programmable bidirectionally.

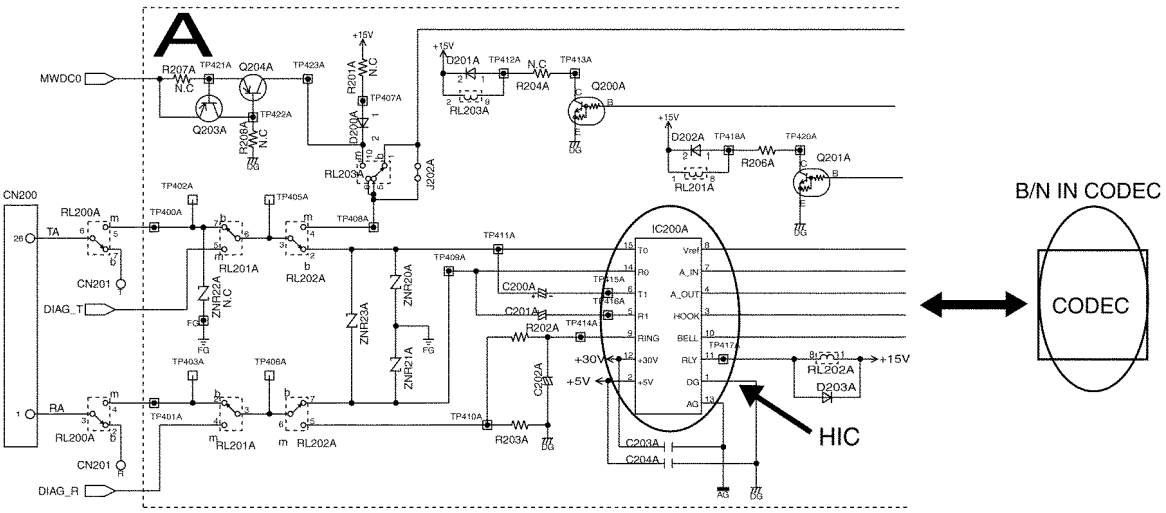
7.2. CODEC FUNCTION(IC201,202,250,251)

Infineon PEB2466 CODEC is installed. The analogue features such as BN, frequency characteristic, volume level, sidetone are configured by ASIC CODEC interface DCLK, CS, DOUT, DIN. In addition, the CODEC has an internal I/O port that supports Hook detection, DTMF detection, BELL relay control and DIAG relay control. Also, it converts A/D to D/A, and 4-line-analogue signal to PCM code in G.711 format.



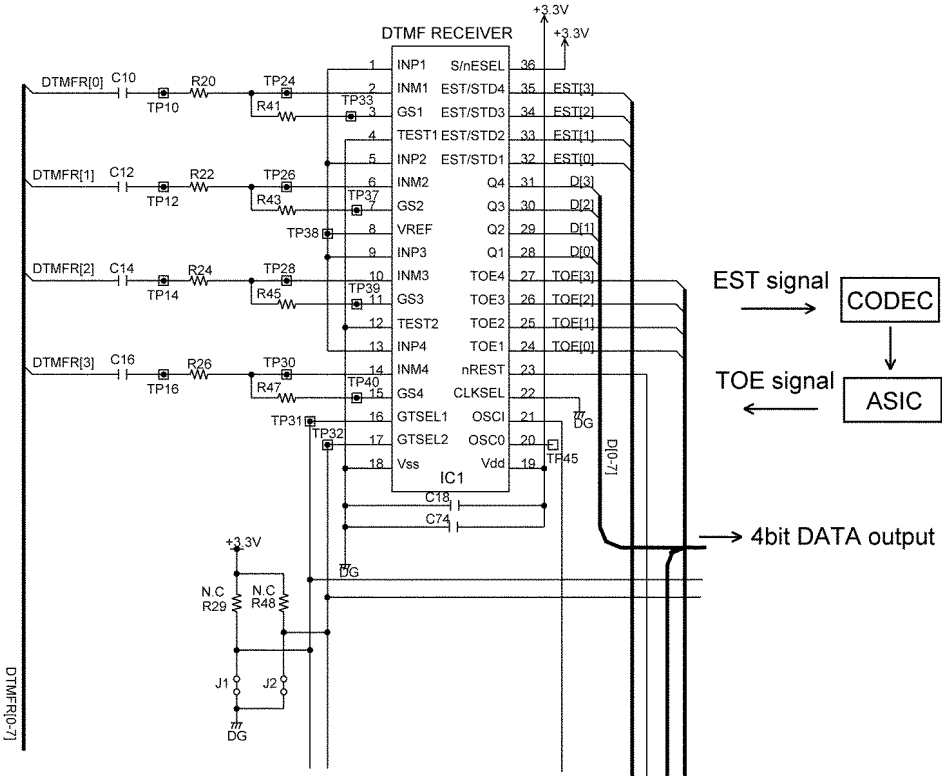
7.3. 2W-4W CONVERSION

It converts 4W-VOX signal used in the PBX to 2W-VOX signal used in SLT, and vice versa. It consists of an operational amplifier in the HIC and a balanced network in the CODEC. It can control the return loss of the audio data and frequency characteristics. By modifying the CODEC program, it can match the corresponding impedance.



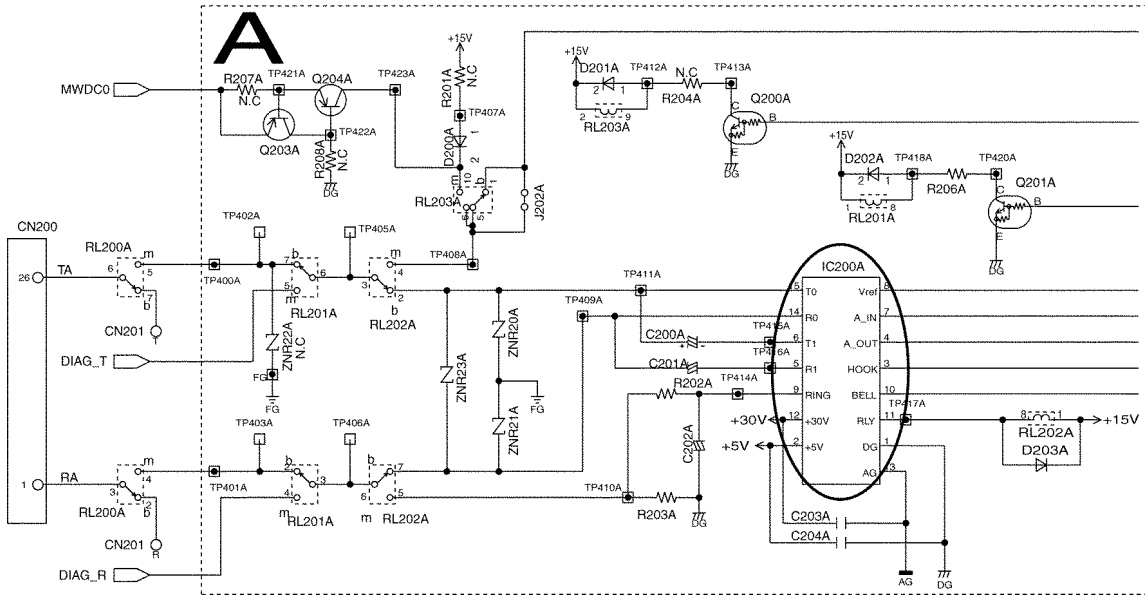
7.4. DTMF SIGNAL DETECTION

Each port has its own DTMF receiver. The receiver detects the signal using IC1 for port A through D, IC2 for port E through H, IC4 for port I through L and IC6 for port M through P. The CODEC detects the DTMF data to be effective at EST terminal=H. This information is detected in the EMPR via SAMSON, then DTMF signal is detected by EMPR reading the DTMF receiver data that came through the SAMSON local bus.



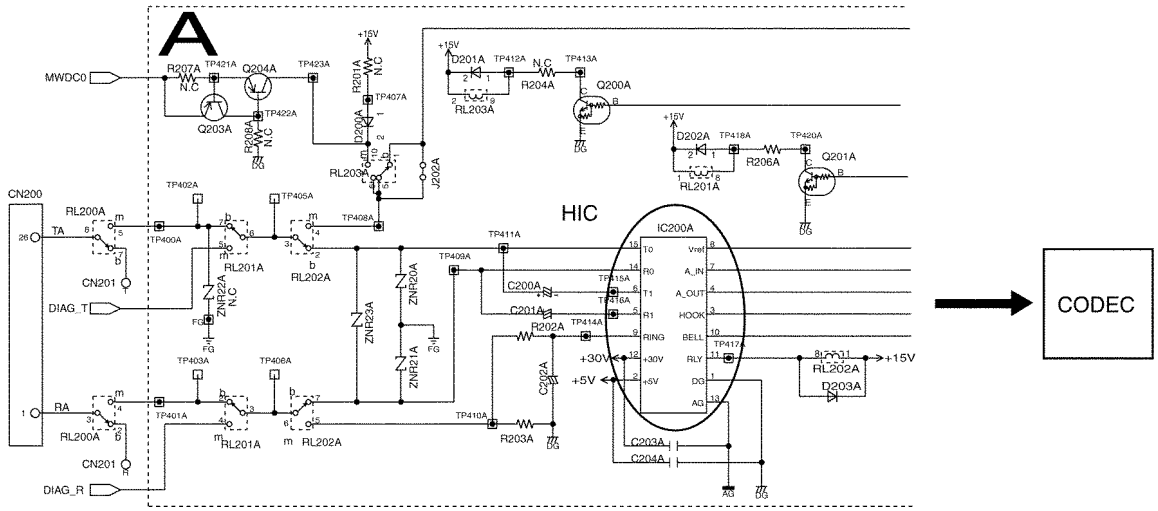
7.5. POWER SUPPLY

A constant-current power supply in HIC provides +30V, ring side 0V grounding to SLC. The maximum feeding current is 30mA.



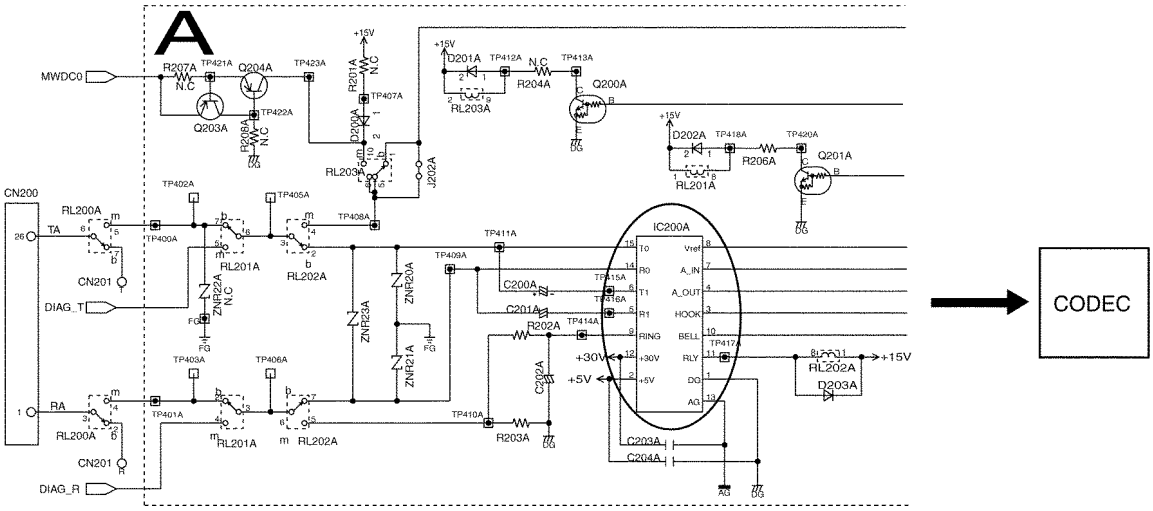
7.6. DIAL PULSE DETECTION

When a telephone initiates pulse dialing, this feature detects the pulse-dialing signal.When the telephone initiates dialing, changes in voltage is detected by the RING terminal in HIC, and this information is transmitted to the HOOK terminal (Example: 3-pin IC200A) as Make=L/Break=H signal. This digital signal is received by CODEC IC (Example: 35-pin IC201) and recognized as dialing signal. Both 10pps and 20pps can be received. The dialing speed is analyzed by software.



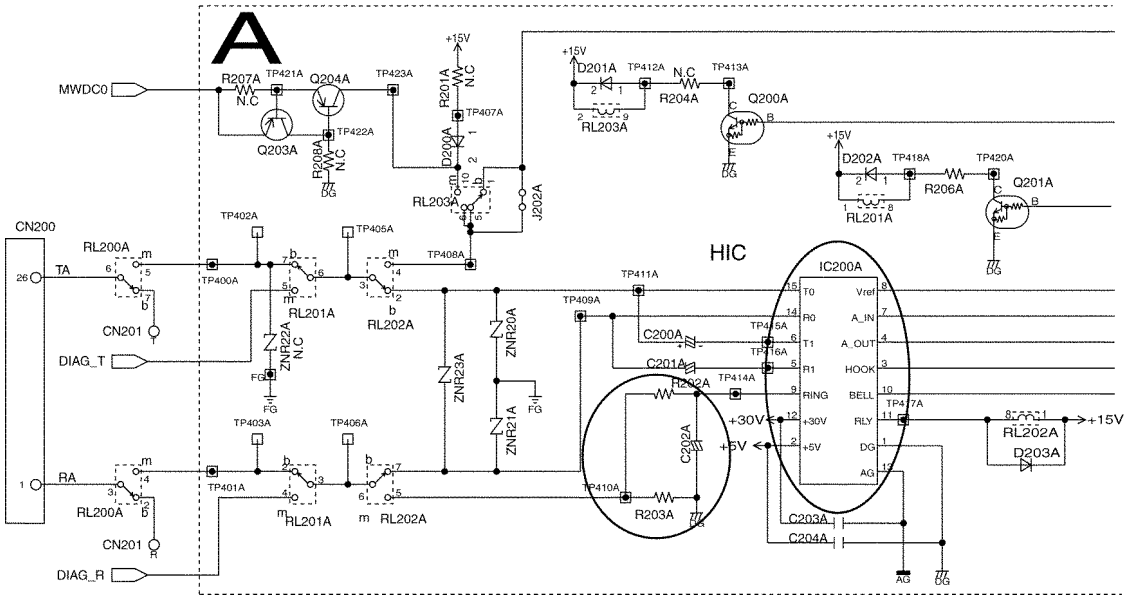
7.7. HOOK DETECTION

The off-hook status is detected when the telephone is off-hook. When a telephone is off-hook, change in voltage is detected by the RING terminal in HIC, and this information is transmitted to the HOOK terminal (Example: 9-pin IC200A) as OFF-HOOK=L/ON HOOK=H signal. This digital signal is received by CODEC IC (Example: 35-pin IC201) and recognized as off-hook signal. The off-hook status is analyzed by software.



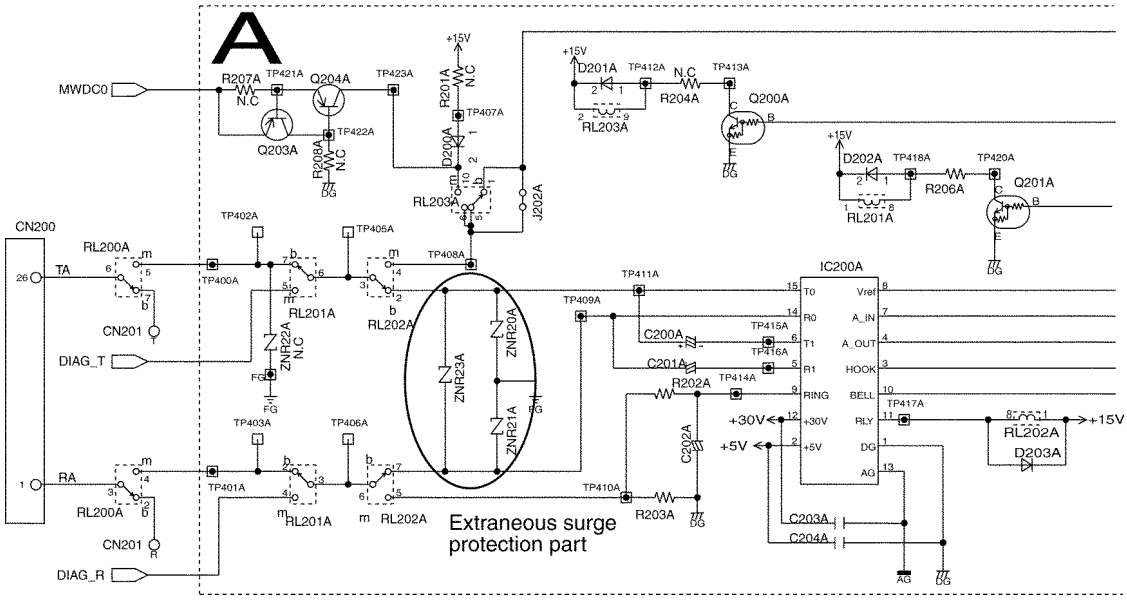
7.8. RING TRIP FEATURE

When the BELL signal is sent out, the off-hook signal from a SLT is detected, and then it breaks the BELL relay.When the handset of a ringing telephone is picked up, a DC loop is formed in the sequence of "Original bell signal", "Internal electrical resistance of a telephone", "Intercom bell load resistance" (R203A-P:1KΩ), and then "Ground" (Since DC30V superimposed in the BELL signal). As a result of this, a voltage rise occurs in Intercom bell load resistance" (R203A-P:1KΩ) in the intercom circuit, and a voltage is placed on the 9-pin RING terminal. This change in voltage turns off the driver transistor of the BELL relay in HIC, and it breaks the BELL relay.



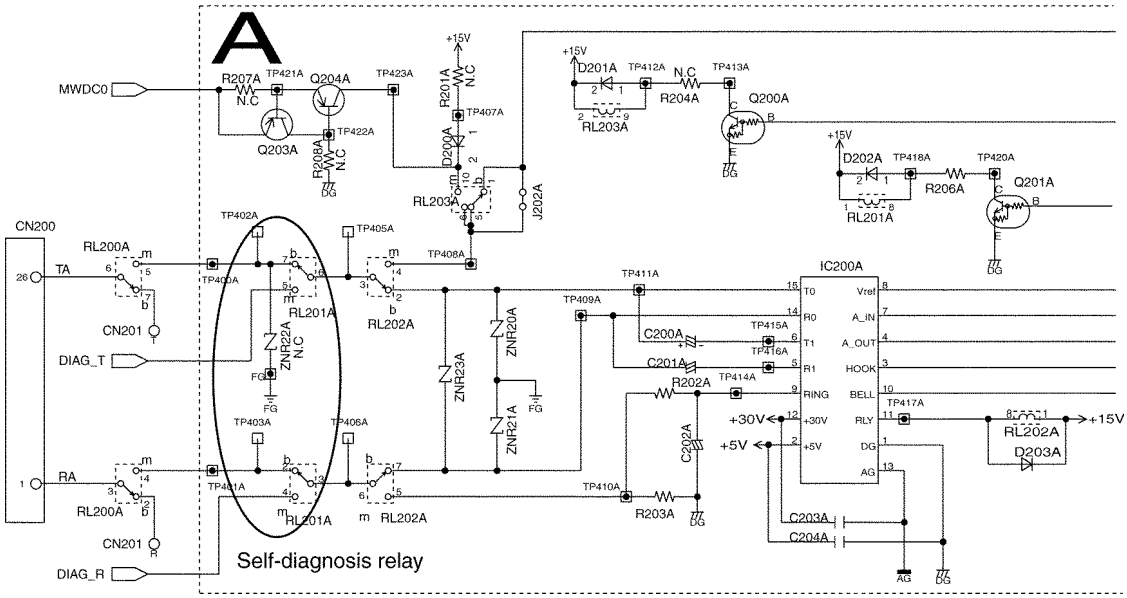
7.9. SURGE PROTECTION

ZNRs installed between T and R, and between T or R and FG protect from extraneous surge.



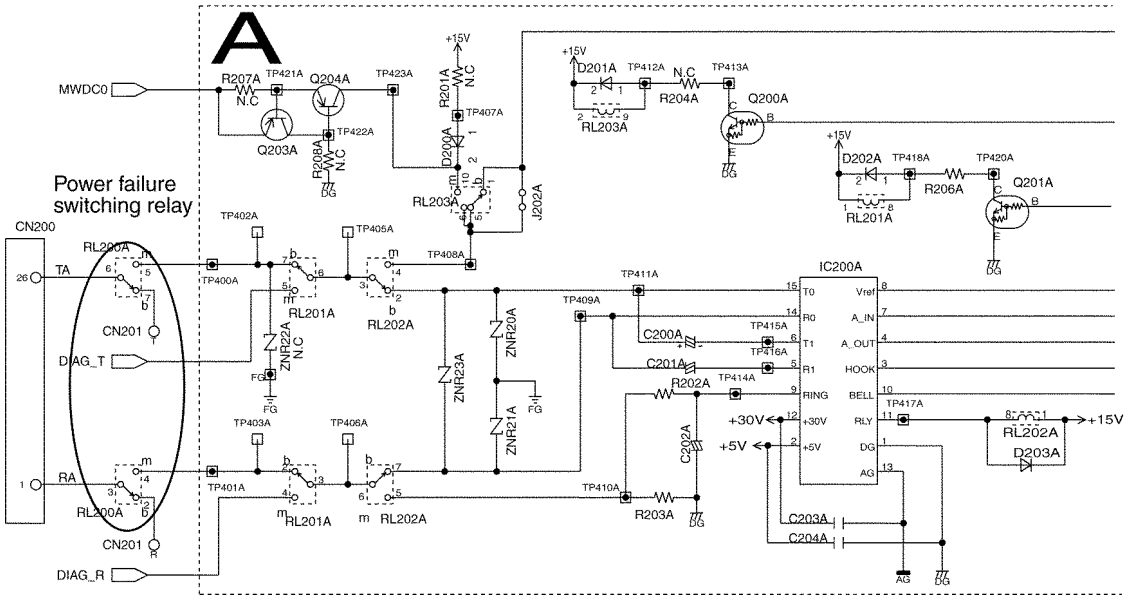
7.10. SELF-DIAGNOSIS

A self-diagnosis relay (RL201A) is installed in A port. In the normal operation mode, it breaks the self-diagnosis relay, and in the self-diagnosis mode, it makes the self-diagnosis relay. In the self-diagnostic mode, A Tip-Ring is connected to the paired Tip-Ring of the outside-line card via backboard, and self-diagnosis is feasible.The self-diagnosis of the outside-line card includes outside call pick up, dial pulse transmission, DTMF transmission, BELL reception and CPC detection.



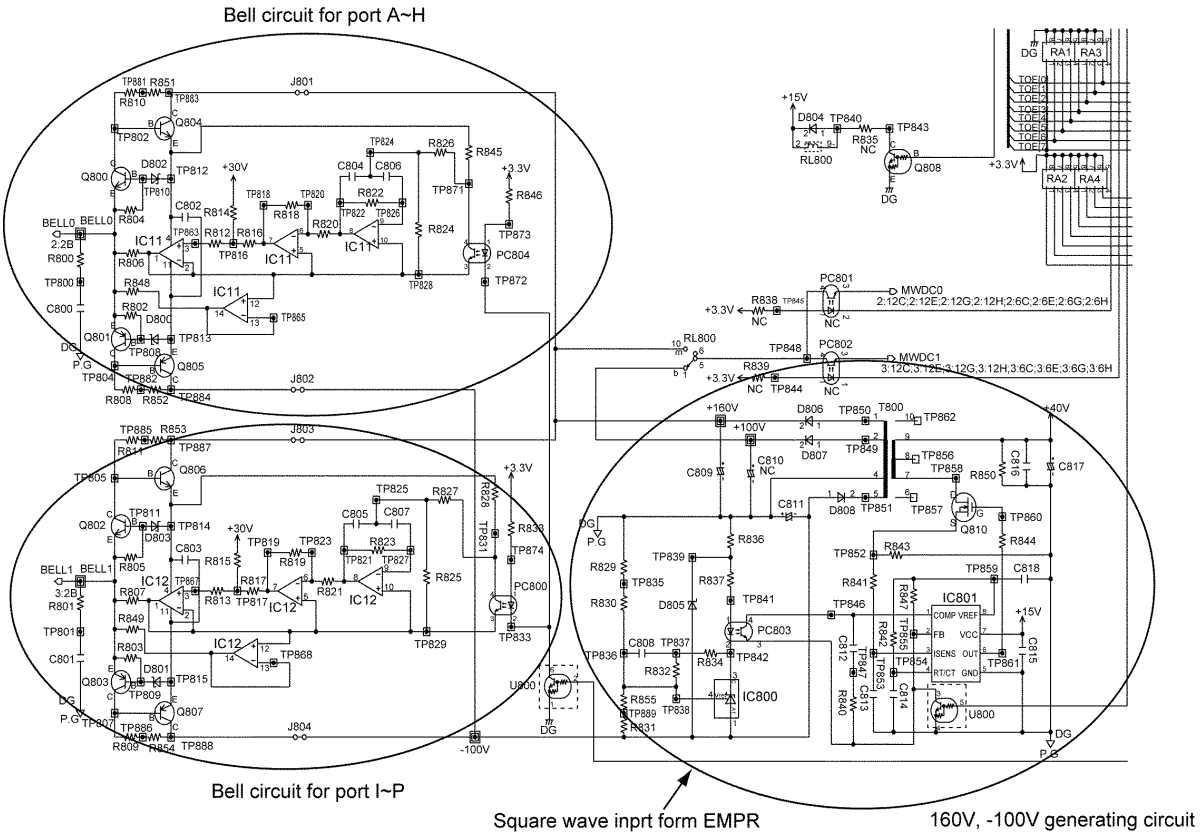
7.11. POWER FAILURE SWITCH FEATURE

4 out of 16 lines have switching relays (RL200A-D) installed in order to enable the outside call during a power failure. The line connected to the outside call card will be directly connected to the CN201/202 located in forward part of the board via a 4-conductor TEL cord. In the normal operation mode, it breaks the power failure switching relay, and during a power failure, it makes the power failure switching relay to initiate Power failure direct connection mode.



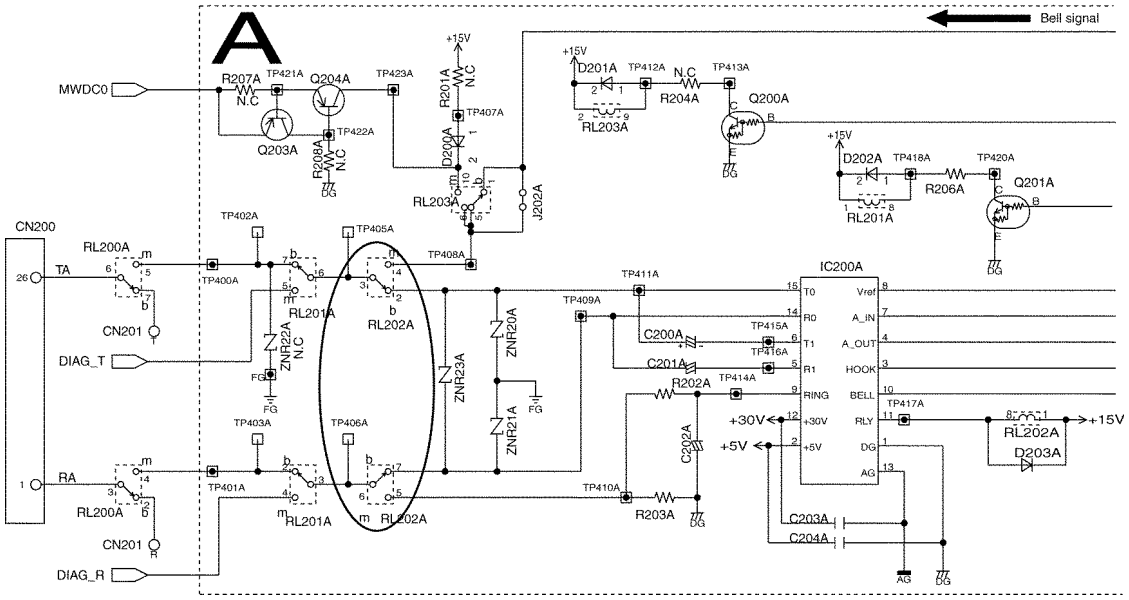
7.12. BELL SIGNAL GENERATOR

Bell signal for ringing an SLT is generated by amplifying the 20 or 25Hz square wave provided from EMPR card to AC75Vrms onboard. The SW power supply in the BELL circuit generates between +160V and -100V of voltage by switching the +40V from the power source at 125KHz frequencies. The Bell signal picks up the square wave provided from EMPR via a photocoupler, and it is transformed into SIN wave, then amplified to AC75Vrm bell signal by the amplitude between +160V and -100V of voltage (Mainly +30Vdc) produced by SW power supply. When the Bell signal is not needed, bell signal voltage generating circuit can be turned off by transmitting H signal from P21 port (BELL CNT) of ASIC to reduce the power consumption.



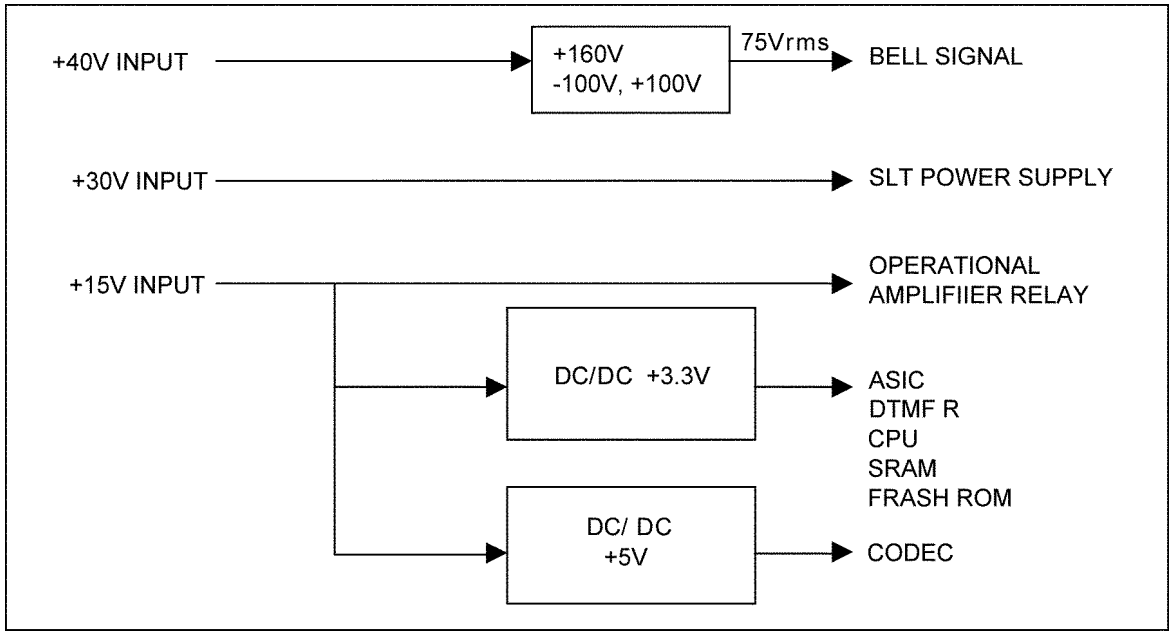
7.13. BELL SIGNAL TRANSMISSION

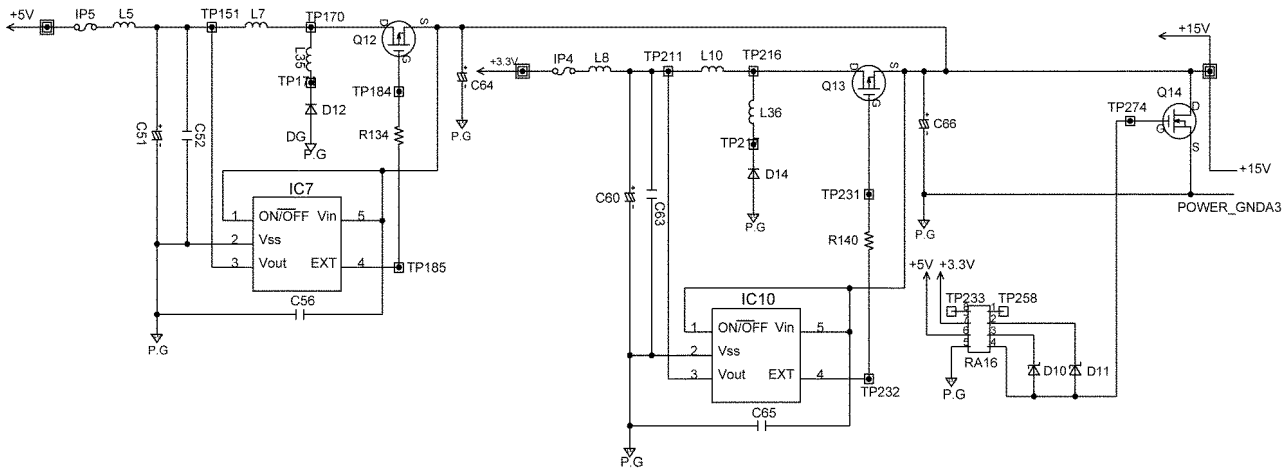
AC 75Vrms bell signal generated onboard is transmitted to the individual port, then control the bell ON/OFF by making a bell relay in each port (Bell signal ON) and by breaking it (Bell signal OFF). The 16 ports do not ring simultaneously. They are divided into 4 layers to control ON/OFF. They are divided in to following 4 groups (The ports in the same group ring simultaneously.): "1, 5, 9, 13", "2, 6, 10, 14", "3, 7, 11, 15" and "4, 8, 12, 16".



7.14. POWER SUPPLY VOLTAGE GENERATOR

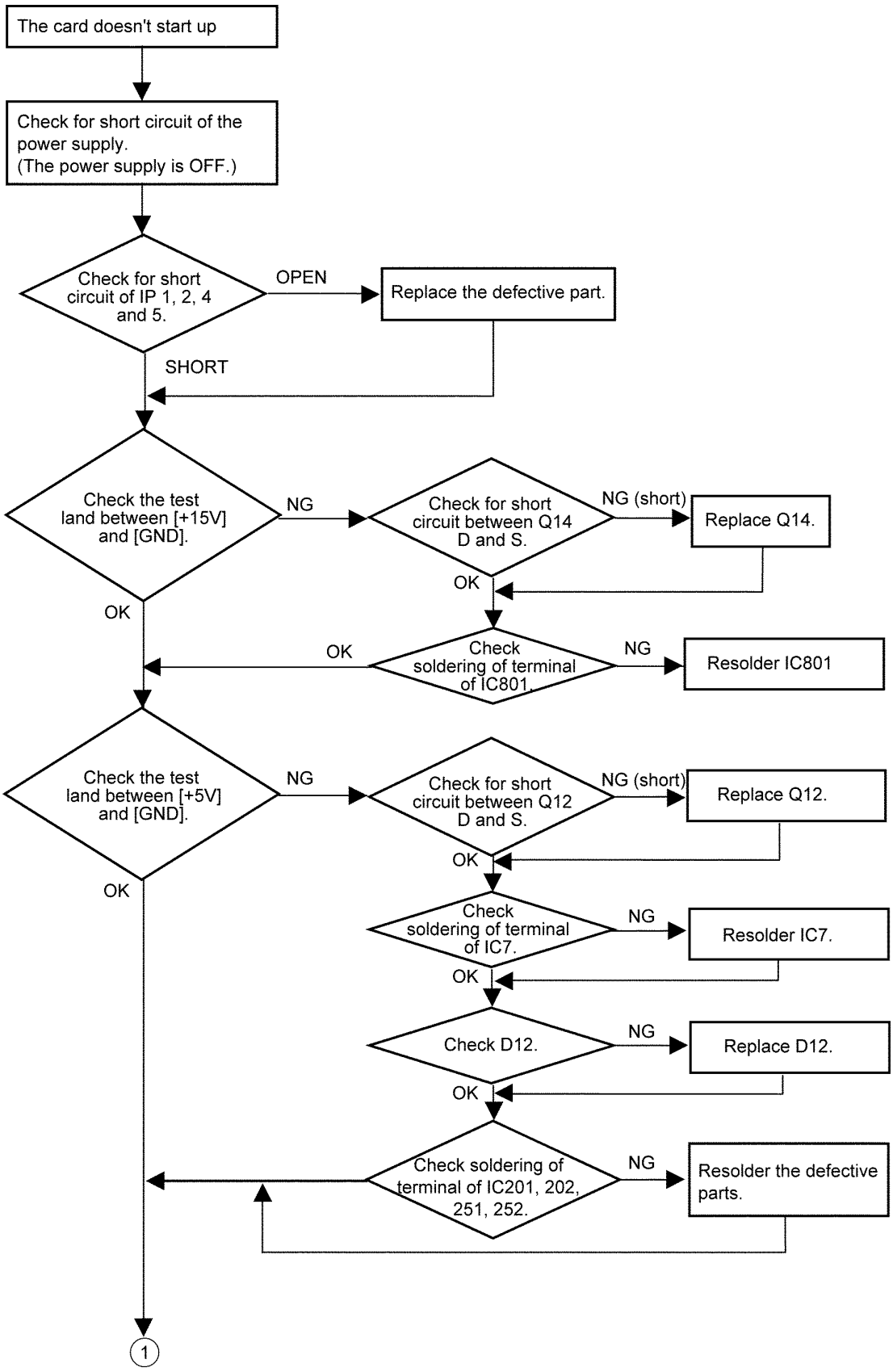
The input from the main power supply is in 3 voltage levels: +15V, +30V, +40V. Since the voltage levels: +15V, +5V, +3.3V, +40V, +160V, +100V, -100V and AC 75Vrms are required onboard, voltage levels are generated onboard as written below.

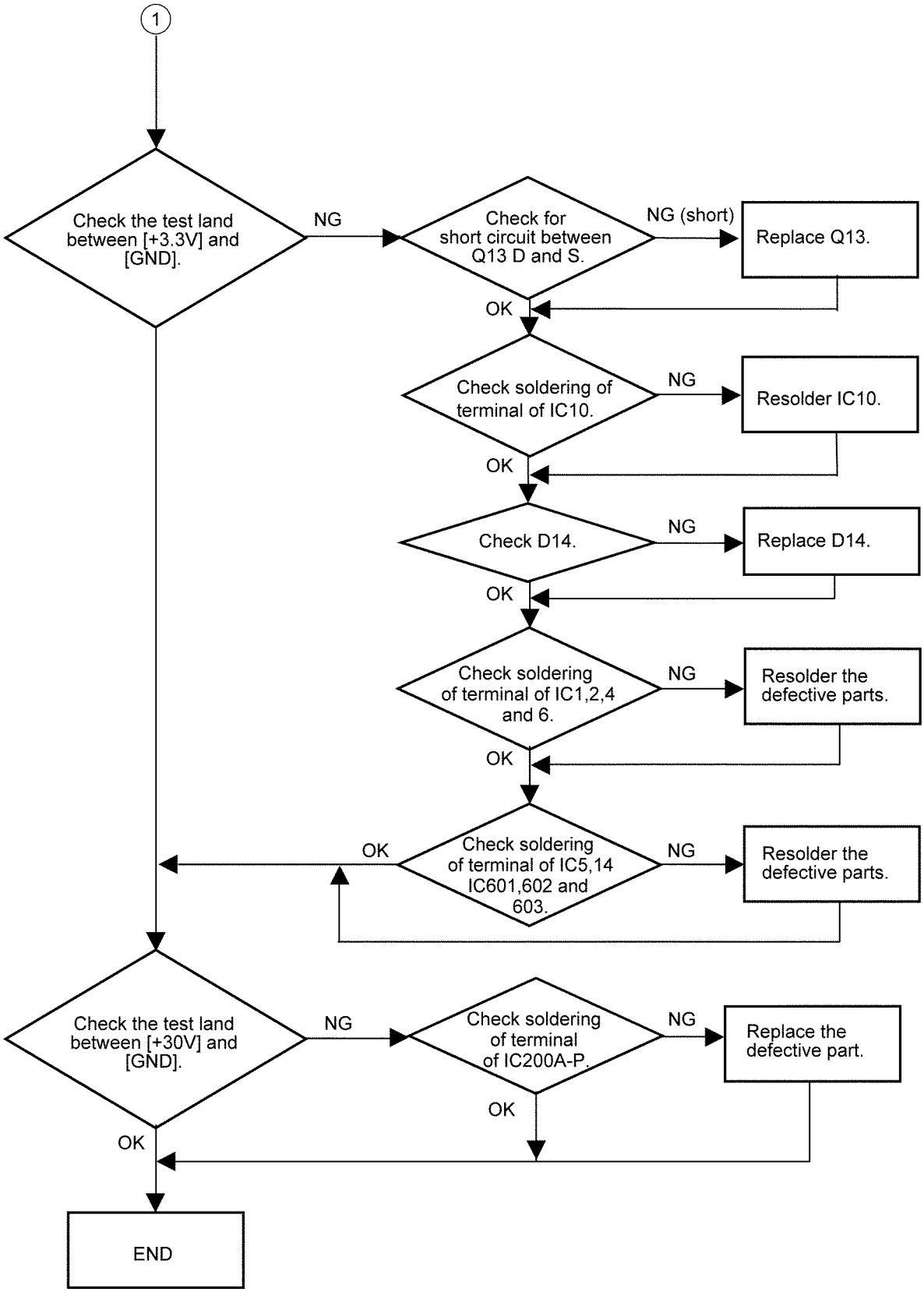


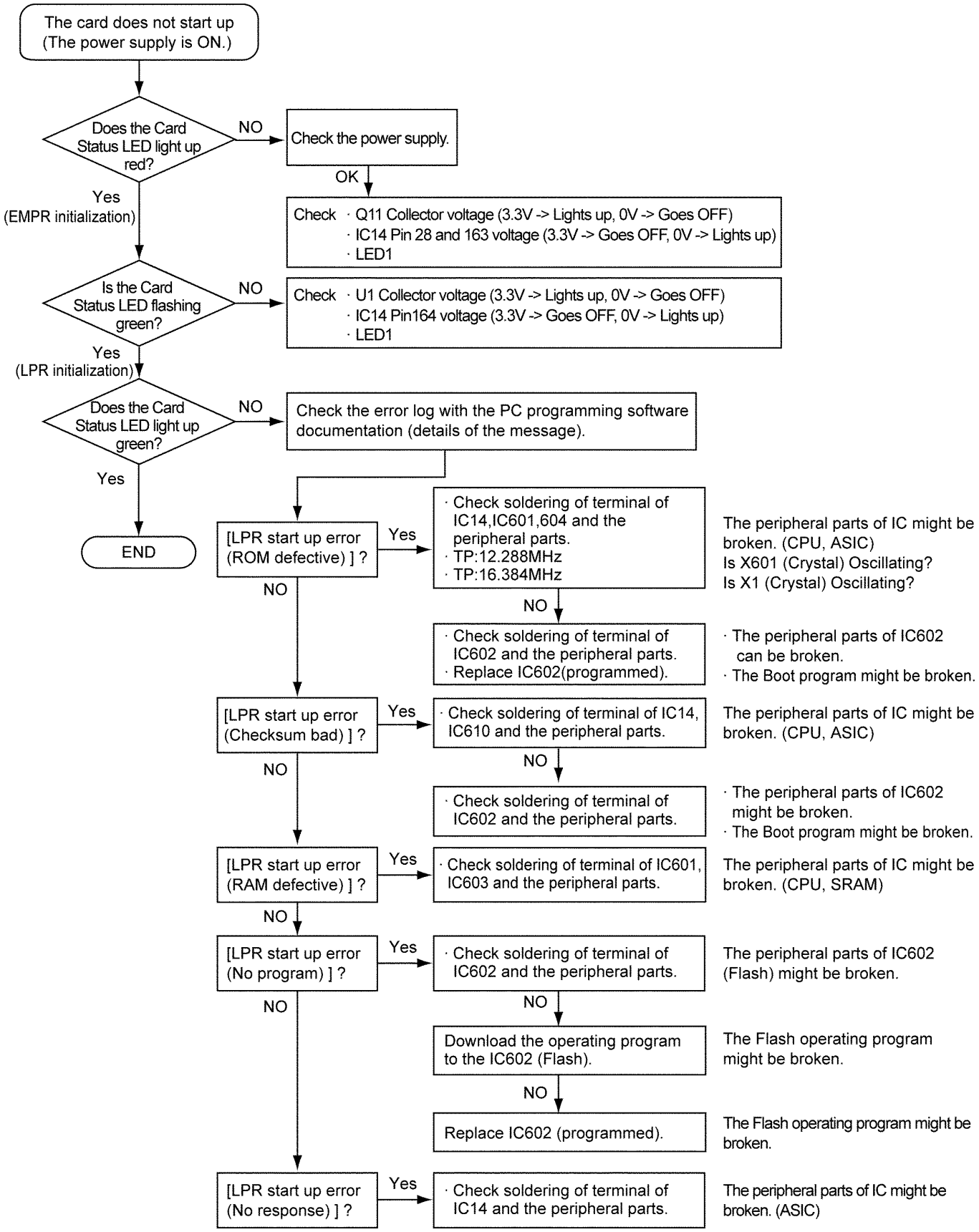


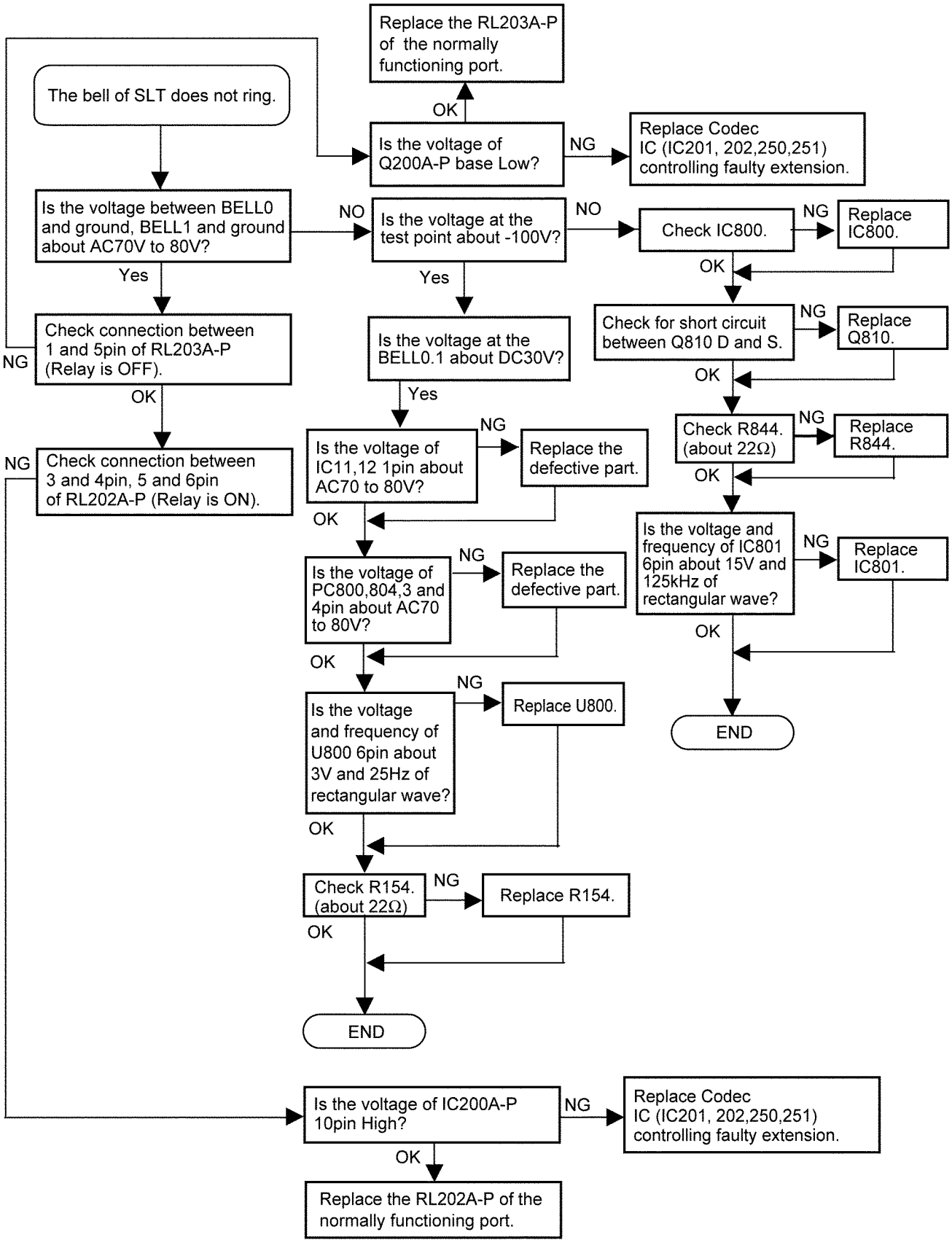
A DC-DC converter that generates +3.3V and +5V from 15V input from the main power supply.It consists of a circuit that steps down the voltage from +15V to +3.3V by the switching power supply of IC10, Q13 and L10, and a circuit that steps down the voltage from +15V to +5V by the switching power supply of IC7, Q12 and L7.As protective circuits, IP4 that protects from +3.3V short circuit, IP5 that protects from +5V short circuit, and an overvoltage protection that breaks IP1 by turning on FET in Q14 when a rise in voltage of +3.3V/+5V is detected.

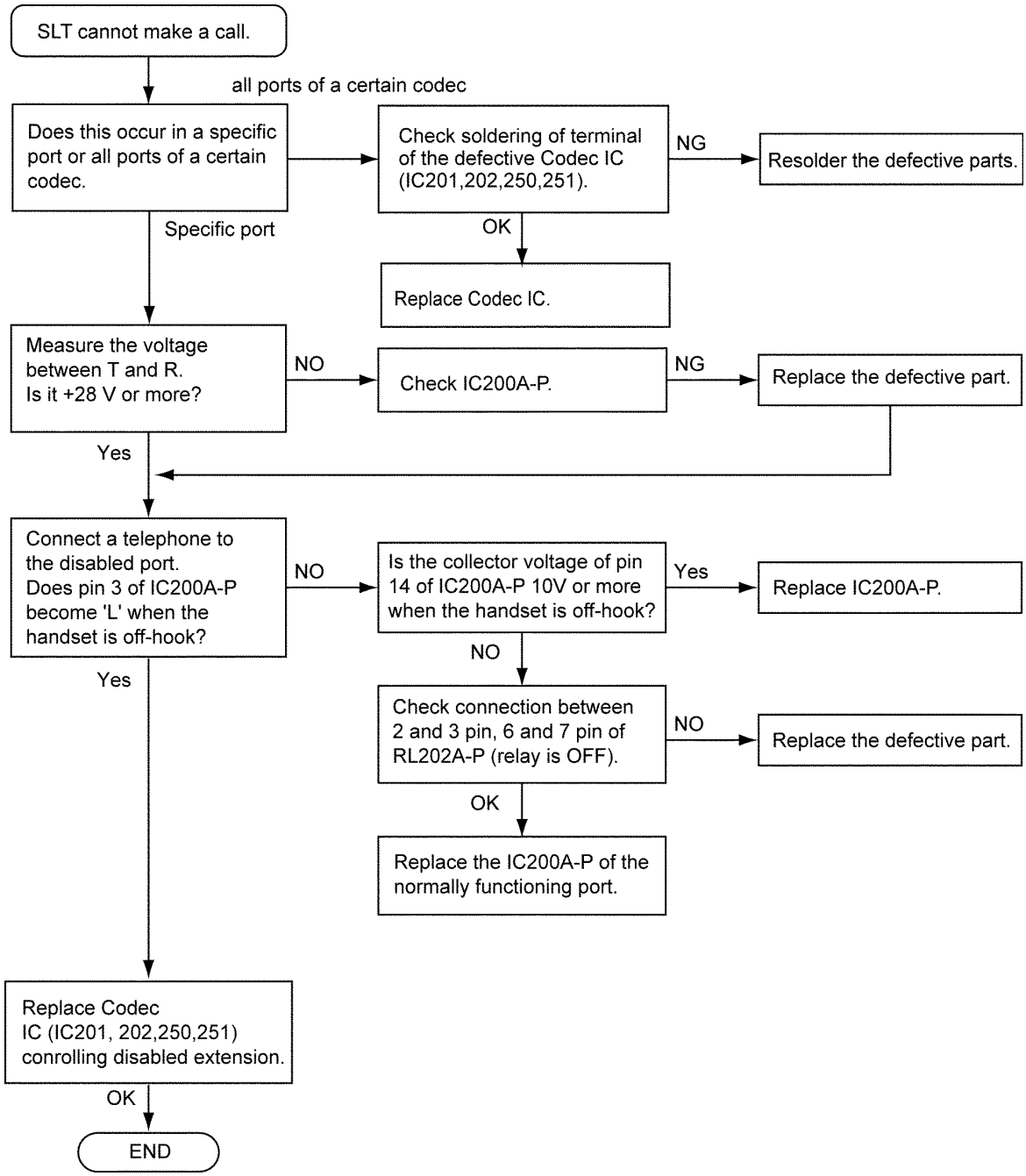
8 TROUBLESHOOTING GUIDE

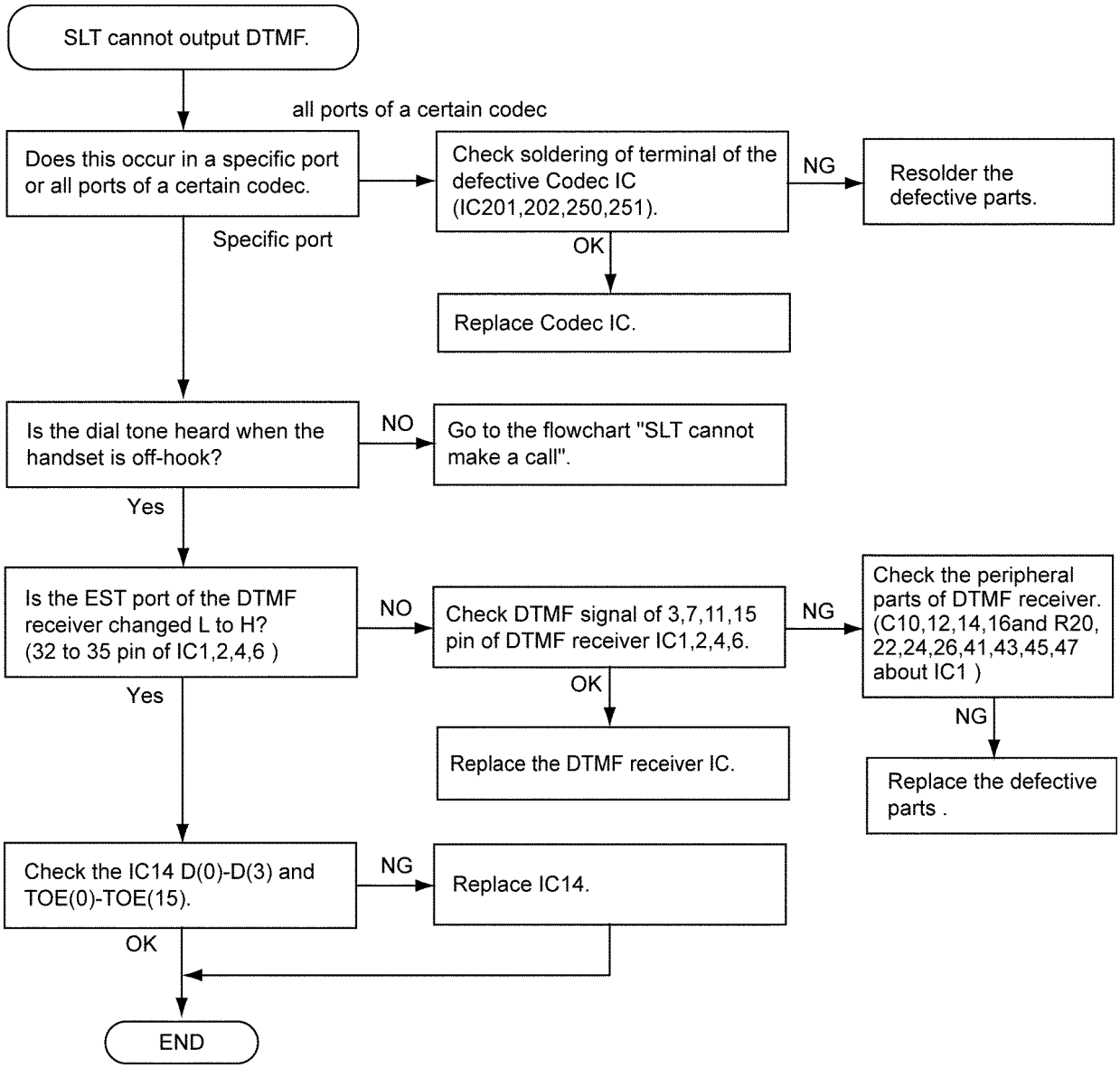


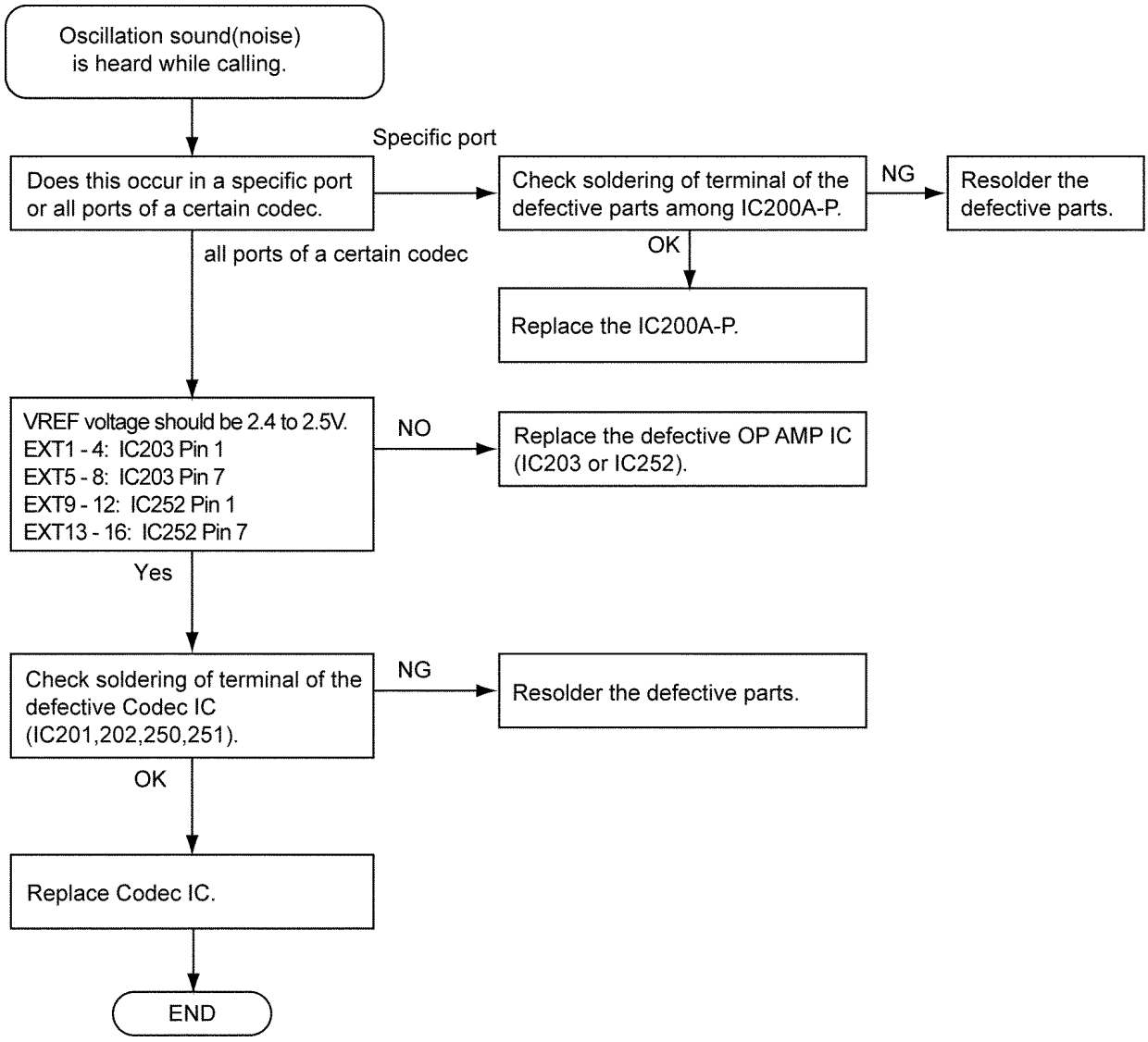

1
Check the test land between [+3.3V] and [GND].
NG
Check for short circuit between Q13 D and S.
NG (short)
Replace Q13.
OK
Check soldering of terminal of IC10.
NG
Resolder IC10.
OK
Check D14.
NG
Replace D14.
OK
Check soldering of terminal of IC1,2,4 and 6.
NG
Resolder the defective parts.
OK
Check soldering of terminal of IC5,14 IC601,602 and 603.
NG
Resolder the defective parts.
OK
Check the test land between [+30V] and [GND].
NG
Check soldering of terminal of IC200A-P.
NG
Replace the defective part.
OK
OK
END


The card does not start up (The power supply is ON.)
Does the Card Status LED light up red?
NO
Check the power supply.
OK
Yes (EMPR initialization)
Check · Q11 Collector voltage (3.3V -> Lights up, 0V -> Goes OFF)
· IC14 Pin 28 and 163 voltage (3.3V -> Goes OFF, 0V -> Lights up)
· LED1
Is the Card Status LED flashing green?
NO
Check · U1 Collector voltage (3.3V -> Lights up, 0V -> Goes OFF)
· IC14 Pin164 voltage (3.3V -> Goes OFF, 0V -> Lights up)
· LED1
Yes (LPR initialization)
Does the Card Status LED light up green?
NO
Check the error log with the PC programming software documentation (details of the message).
Yes
END
[LPR start up error (ROM defective)] ?
Yes
· Check soldering of terminal of IC14,IC601,604 and the peripheral parts.
· TP:12.288MHz
· TP:16.384MHz
The peripheral parts of IC might be broken. (CPU, ASIC)
Is X601 (Crystal) Oscillating?
Is X1 (Crystal) Oscillating?
NO
· Check soldering of terminal of IC602 and the peripheral parts.
· Replace IC602(programmed).
· The peripheral parts of IC602 can be broken.
· The Boot program might be broken.
NO
[LPR start up error (Checksum bad)] ?
Yes
· Check soldering of terminal of IC14, IC610 and the peripheral parts.
The peripheral parts of IC might be broken. (CPU, ASIC)
NO
· Check soldering of terminal of IC602 and the peripheral parts.
· The peripheral parts of IC602 might be broken.
· The Boot program might be broken.
NO
[LPR start up error (RAM defective)] ?
Yes
· Check soldering of terminal of IC601, IC603 and the peripheral parts.
The peripheral parts of IC might be broken. (CPU, SRAM)
NO
[LPR start up error (No program)] ?
Yes
· Check soldering of terminal of IC602 and the peripheral parts.
The peripheral parts of IC602 (Flash) might be broken.
NO
Download the operating program to the IC602 (Flash).
The Flash operating program might be broken.
NO
Replace IC602 (programmed).
The Flash operating program might be broken.
NO
[LPR start up error (No response)] ?
Yes
· Check soldering of terminal of IC14 and the peripheral parts.
The peripheral parts of IC might be broken. (ASIC)


The bell of SLT does not ring.
Is the voltage between BELL0 and ground, BELL1 and ground about AC70V to 80V?
NO
Yes
NG
Check connection between 1 and 5pin of RL203A-P (Relay is OFF).
OK
NG
Check connection between 3 and 4pin, 5 and 6pin of RL202A-P (Relay is ON).
Is the voltage of Q200A-P base Low?
OK
Replace the RL203A-P of the normally functioning port.
NG
Replace Codec IC (IC201, 202,250,251) controlling faulty extension.
Is the voltage at the test point about -100V?
NO
Yes
Is the voltage at the BELL0.1 about DC30V?
Yes
Is the voltage of IC11,12 1pin about AC70 to 80V?
NG
Replace the defective part.
OK
Is the voltage of PC800,804,3 and 4pin about AC70 to 80V?
NG
Replace the defective part.
OK
Is the voltage and frequency of U800 6pin about 3V and 25Hz of rectangular wave?
NG
Replace U800.
OK
Check R154. (about 22Ω)
NG
Replace R154.
OK
END
Check IC800.
NG
Replace IC800.
OK
Check for short circuit between Q810 D and S.
NG
Replace Q810.
OK
Check R844. (about 22Ω)
NG
Replace R844.
OK
Is the voltage and frequency of IC801 6pin about 15V and 125kHz of rectangular wave?
NG
Replace IC801.
OK
END
Is the voltage of IC200A-P 10pin High?
NG
Replace Codec IC (IC201, 202,250,251) controlling faulty extension.
OK
Replace the RL202A-P of the normally functioning port.

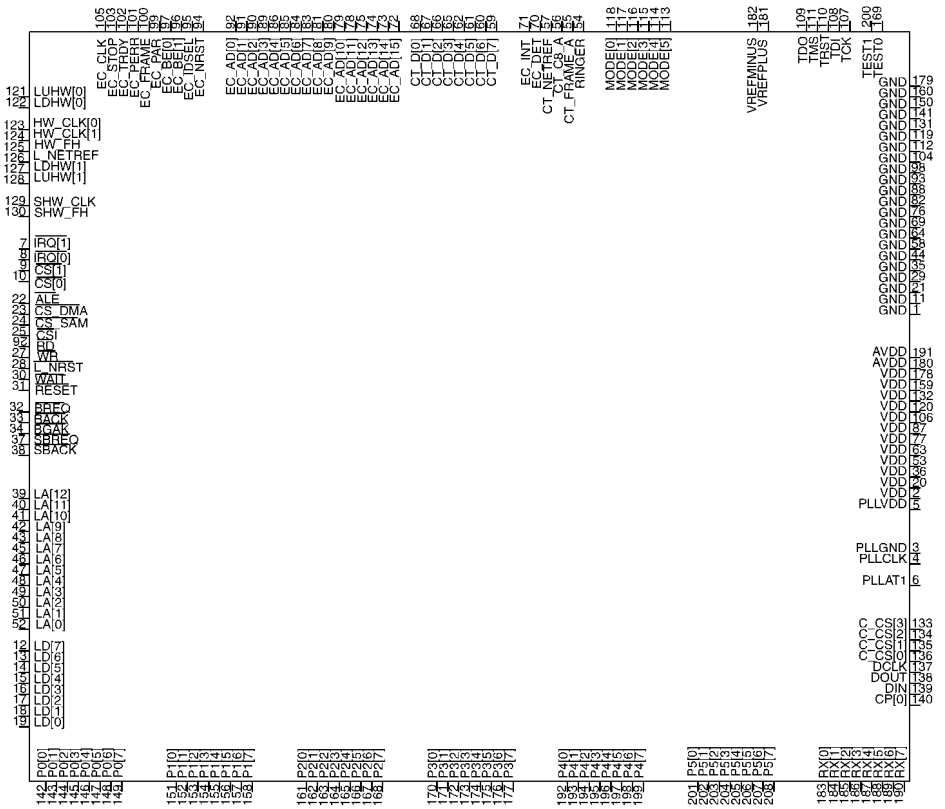

SLT cannot make a call.
all ports of a certain codec
Does this occur in a specific port or all ports of a certain codec.
Check soldering of terminal of the defective Codec IC (IC201,202,250,251).
NG
Resolder the defective parts.
Specific port
OK
Replace Codec IC.
Measure the voltage between T and R. Is it +28 V or more?
NO
Check IC200A-P.
NG
Replace the defective part.
Yes
Connect a telephone to the disabled port. Does pin 3 of IC200A-P become 'L' when the handset is off-hook?
NO
Is the collector voltage of pin 14 of IC200A-P 10V or more when the handset is off-hook?
Yes
Replace IC200A-P.
NO
Yes
Check connection between 2 and 3 pin, 6 and 7 pin of RL202A-P (relay is OFF).
NO
Replace the defective part.
OK
Replace the IC200A-P of the normally functioning port.
Replace Codec IC (IC201, 202,250,251) conrolling disabled extension.
OK
END


SLT cannot output DTMF.
all ports of a certain codec
Does this occur in a specific port or all ports of a certain codec.
Check soldering of terminal of the defective Codec IC (IC201,202,250,251).
NG
Resolder the defective parts.
Specific port
OK
Replace Codec IC.
Is the dial tone heard when the handset is off-hook?
NO
Go to the flowchart "SLT cannot make a call".
Yes
Is the EST port of the DTMF receiver changed L to H? (32 to 35 pin of IC1,2,4,6)
NO
Check DTMF signal of 3,7,11,15 pin of DTMF receiver IC1,2,4,6.
NG
Check the peripheral parts of DTMF receiver. (C10,12,14,16and R20, 22,24,26,41,43,45,47 about IC1)
Yes
OK
NG
Replace the DTMF receiver IC.
Replace the defective parts .
Check the IC14 D(0)-D(3) and TOE(0)-TOE(15).
NG
Replace IC14.
OK
END


Oscillation sound(noise) is heard while calling.
Does this occur in a specific port or all ports of a certain codec.
Specific port
Check soldering of terminal of the defective parts among IC200A-P.
NG
Resolder the defective parts.
OK
Replace the IC200A-P.
all ports of a certain codec
VREF voltage should be 2.4 to 2.5V.
EXT1 - 4: IC203 Pin 1
EXT5 - 8: IC203 Pin 7
EXT9 - 12: IC252 Pin 1
EXT13 - 16: IC252 Pin 7
NO
Replace the defective OP AMP IC (IC203 or IC252).
Yes
Check soldering of terminal of the defective Codec IC (IC201,202,250,251).
NG
Resolder the defective parts.
OK
Replace Codec IC.
END

9 IC DATA

9.1. IC14(ASIC)

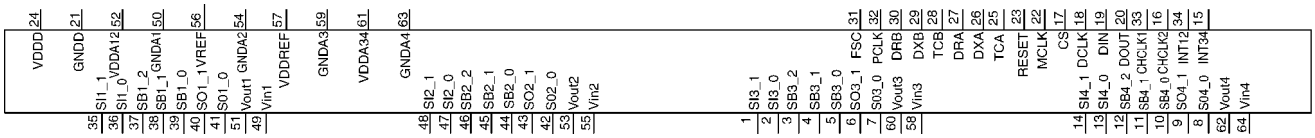


ADDRESS	PIN No.	SIGNAL NAME	I/O	ACT	DESCRIPTIONS	NOTES
xxx1180	P07	Used as "DTMF R OUTPUT ENABLED"	O	H		
	P06		O	H		
	P05		O	H		
	P04		O	H		
	P03		O	H		
	P02		O	H		
	P01		O	H		
	P00		O	H		
xxx1181	P17	VER5	I	L	RAM(H: 2Mbit, L: 1Mbit)	
	P16	VER4	I	H/L	Card recognition	
	P15	VER3	I	H/L		
	P14	VER2	I	H/L	Hardware version management Initial No. =0	
	P13	VER1	I	H/L		
	P12	VER0	I	H/L		
	P11	PORT1	I	H	Port No. 16	
	P10	PORT0	I	H		
xx1182	P27		O	L		
	P26	PF_RLY	O	L	Power failure direct connection switch	
	P25	MWPOW1	O	H		
	P24	MWPOW0	O	H		
	P23	LED_G	O	L	Green LED ON	
	P22	LED_R	O	L	RED LED ON	
	P21	BELL CNT	O	L	Bell relay stop	
	P20		I		HIGH (Fixed)	
xxx1183	P37		I		HIGH(Fixed)	
	P36		I		HIGH(Fixed)	
	P35		I		HIGH(Fixed)	
	P34		I		HIGH(Fixed)	
	P33		I		HIGH(Fixed)	
	P32		I		HIGH(Fixed)	
	P31		I		HIGH(Fixed)	
	P30		I		HIGH(Fixed)	

ADDRESS	PIN No.	SIGNAL NAME	I/O	ACT	DESCRIPTIONS	NOTES
xxx1184	P47	Used as "DTMF R OUTPUT ENABLED"	O	H		
	P46		O	H		
	P45		O	H		
	P44		O	H		
	P43		O	H		
	P42		O	H		
	P41		O	H		
	P40		O	H		
xxx1185	P57		I		HIGH(Fixed)	
	P56		I		HIGH(Fixed)	
	P55		I		HIGH(Fixed)	
	P54		I		HIGH(Fixed)	
	P53		I		HIGH(Fixed)	
	P52		I		HIGH(Fixed)	
	P51		I		HIGH(Fixed)	
	P50		I		HIGH(Fixed)	

9.2. IC201, IC202, IC250, IC251 (CODEC I/O PORT)

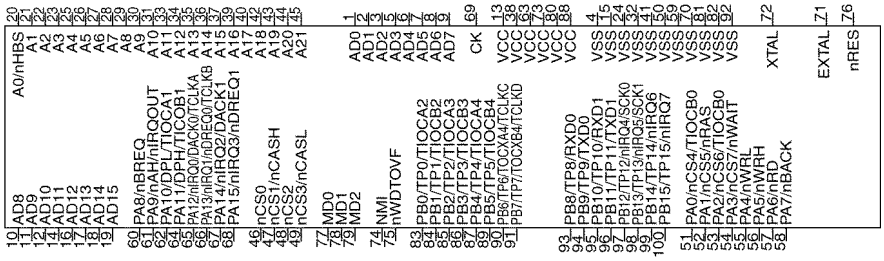
The table below shows correspondence of CODEC pins and Signal names.



CODEC	EXTENSION PORT	PIN No.	SIGNAL NAME	I/O	ACT	DESCRIPTIONS	NOTES
CODECIC201	EXT0	SO1_1		O			L (Fixed)
		SO1_0	BELL0	O	H	Ringer output	
		SB1_2		O			+5V pull up
		SB1_1	DIAG_RLY0	O	H	Self diagnosis switching	
		SB1_0		O			+5V pull up
		SI1_1	HOOK0	I	L	Off-hook detection	
		SI1_0	DT_EST0	I	H	DTMF detection	
	EXT1	SO2_1		O			L(Fixed)
		SO2_0	BELL1	O	H	Ringer output	
		SB2_2		O			+5V pull up
		SB2_1		O	H		
		SB2_0		O			+5V pull up
		SI2_1	HOOK1	I	L	Off-hook detection	
		SI2_0	DT_EST1	I	H	DTMF detection	
	EXT2	SO3_1		O			L (Fixed)
		SO3_0	BELL2	O	H	Ringer output	
		SB3_2		O			+5V pull up
		SB3_1		O	H		
		SB3_0		O			+5V pull up
		SI3_1	HOOK2	I	L	Off-hook detection	
		SI3_0	DT_EST2	I	H	DTMF detection	
	EXT3	SO4_1		O			L (Fixed)
		SO4_0	BELL3	O	H	Ringer output	
		SB4_2		O			+5V pull up
		SB4_1		O	H		
		SB4_0		O			+5V pull up
		SI4_1	HOOK3	I	L	Off-hook detection	
		SI4_0	DT_EST3	I	H	DTMF detection	
CODECIC202	EXT4	SO1_1		O			L (Fixed)
		SO1_0	BELL4	O	H	Ringer output	
		SB1_2		O			+5V pull up
		SB1_1		O	H		
		SB1_0		O			+5V pull up
		SI1_1	HOOK4	I	L	Off-hook detection	
		SI1_0	DT_EST4	I	H	DTMF detection	
	EXT5	SO2_1		O			L (Fixed)
		SO2_0	BELL5	O	H	Ringer output	
		SB2_2		O			+5V pull up
		SB2_1		O	H		
		SB2_0		O			+5V pull up
		SI2_1	HOOK5	I	L	Off-hook detection	
		SI2_0	DT_EST5	I	H	DTMF detection	
	EXT6	SO3_1		O			L (Fixed)
		SO3_0	BELL6	O	H	Ringer output	
		SB3_2		O			+5V pull up
		SB3_1		O	H		
		SB3_0		O			+5V pull up
		SI3_1	HOOK6	I	L	Off-hook detection	
		SI3_0	DT_EST6	I	H	DTMF detection	
	EXT7	SO4_1		O			L (Fixed)
		SO4_0	BELL7	O	H	Ringer output	
		SB4_2		O			+5V pull up
		SB4_1		O	H		
		SB4_0		O			+5V pull up
		SI4_1	HOOK7	I	L	Off-hook detection	
		SI4_0	DT_EST7	I	H	DTMF detection	

CODEC	EXTENSION PORT	PIN No.	SIGNAL NAME	I/O	ACT	DESCRIPTIONS	NOTES
CODECIC250	EXT8	SO1_1		O			L (Fixed)
		SO1_0	BELL8	O	H	Ringer output	
		SB1_2		O			+5V pull up
		SB1_1		O	H		
		SB1_0		O			+5V pull up
		SI1_1	HOOK8	I	L	Off-hook detection	
		SI1_0	DT_EST8	I	H	DTMF detection	
	EXT9	SO2_1		O			L (Fixed)
		SO2_0	BELL9	O	H	Ringer output	
		SB2_2		O			+5V pull up
		SB2_1		I	H		
		SB2_0		O			+5V pull up
		SI2_1	HOOK9	I	L	Off-hook detection	
		SI2_0	DT_EST9	I	H	DTMF detection	
	EXT10	SO3_1		O			L (Fixed)
		SO3_0	BELL10	O	H	Ringer output	
		SB3_2		O			+5V pull up
		SB3_1		O	H		
		SB3_0		O			+5V pull up
		SI3_1	HOOK10	I	L	Off-hook detection	
		SI3_0	DT_EST10	I	H	DTMF detection	
	EXT11	SO4_1		O			L (Fixed)
		SO4_0	BELL11	O	H	Ringer output	
		SB4_2		O			+5V pull up
		SB4_1		O	H		
		SB4_0		O			+5V pull up
		SI4_1	HOOK11	I	L	Off-hook detection	
		SI4_0	DT_EST11	I	H	DTMF detection	
CODECIC251	EXT12	SO1_1		O			L (Fixed)
		SO1_0	BELL12	O	H	Ringer output	
		SB1_2		O			+5V pull up
		SB1_1		O	H		
		SB1_0		O			+5V pull up
		SI1_1	HOOK12	I	L	Off-hook detection	
		SI1_0	DT_EST12	I	H	DTMF detection	
	EXT13	SO2_1		O			L (Fixed)
		SO2_0	BELL13	O	H	Ringer output	
		SB2_2		O			+5V pull up
		SB2_1		O	H		
		SB2_0		O			+5V pull up
		SI2_1	HOOK13	I	L	Off-hook detection	
		SI2_0	DT_EST13	I	H	DTMF detection	
	EXT14	SO3_1		O			L (Fixed)
		SO3_0	BELL14	O	H	Ringer output	
		SB3_2		O			+5V pull up
		SB3_1		O	H		
		SB3_0		O			+5V pull up
		SI3_1	HOOK14	I	L	Off-hook detection	
		SI3_0	DT_EST14	I	H	DTMF detection	
	EXT15	SO4_1		O			L (Fixed)
		SO4_0	BELL15	O	H	Ringer output	
		SB4_2		O			+5V pull up
		SB4_1		O	H		
		SB4_0		O			+5V pull up
		SI4_1	HOOK15	I	L	Off-hook detection	
		SI4_0	DT_EST15	I	H	DTMF detection	

9.3. IC601 (CPU) I/O MAP



Pin No.	Pin name	Signal name	I/O	ACT	Description	Remarks
68	PA15					
67	PA14	BELL_SYNC	I	L↓	BELL phase detection	Used as nIRQ2
66	PA13	nIRQ1	I	L	EMPR interrupt	Used as nIRQ1
65	PA12	HALT	I	H	DC power down recovery detection	Used as nIRQ0
64	PA11	nRTS	O	L	Serial I/F for debug	
62	PA10	nCTS	I	L	Serial I/F for debug	
61	PA9		O	H	Not used	
60	PA8	nBREQ	I	L	Bus request from EMPR	Used as nBREQ
58	PA7	nBACK	O	L	Response to bus request from EMPR	Used as nBACK
57	PA6	nRD	O	L	Read signal	Used as nRD
56	PA5		O	H	Not used	
55	PA4	nWR	O	L	Write signal	Used as nWR
54	PA3	nWAIT	I	L	Wait signal	Used as nWAIT
53	PA2		O		Not used	
52	PA1		O		Not used	
51	PA0		O		Not used	
100	PB15		O		Not used	
99	PB14		O		Not used	
98	PB13		O		Not used	
97	PB12		O		Not used	
96	PB11		I		Not used	
95	PB10		O		Not used	
94	PB9	TX			Serial I/F for debug	Used as TXD0
93	PB8	RX			Serial I/F for debug	Used as RXD0
91	PB7	BID2	I	L	Board classification judgment (Use undecided)	
90	PB6	BID1	I	L	Board classification judgment (Use undecided)	
89	PB5	BID0	I	L	Board classification judgment (Use undecided)	
87	PB4	PB4	I	H	H: Operation, L: Debug	
86	PB3	nFlash Busy	I	L	Flash memory Busy	
85	PB2		I	L	Not used	
84	PB1		O		Not used	
83	PB0		O		Not used	

10 HOW TO REPLACE A FLAT PACKAGE IC

Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

10.1. PREPARATION

- PbF (: Pb free) Solder
- Soldering Iron

  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)

  Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
- Flux

  Recommended Flux: Specific Gravity → 0.82.

  Type → RMA (lower residue, non-cleaning type)

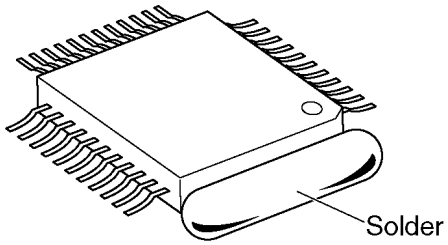
  Note: See **ABOUT LEAD FREE SOLDER (PbF: Pb free)** (P.3).

10.2. REMOVAL PROCEDURE

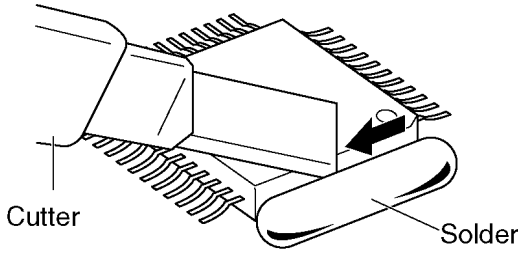
1. Put plenty of solder on the IC pins so that the pins can be completely covered.

   Note:

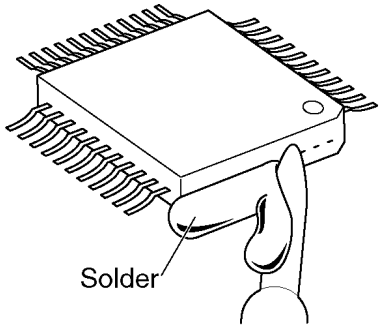
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



2. Make a few cuts into the joint (between the IC and its pins) first and then cut off the pins thoroughly.



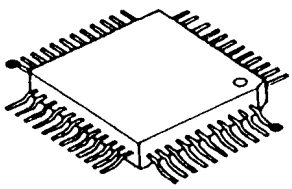
3. While the solder melts, remove it together with the IC pins.



When you attach a new IC to the board, remove all solder left on the land with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

10.3. INSTALLATION PROCEDURE

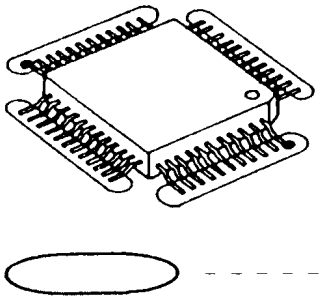
1. Tack the flat pack IC to the PCB by temporarily soldering two diagonally opposite pins in the correct positions on the PCB.



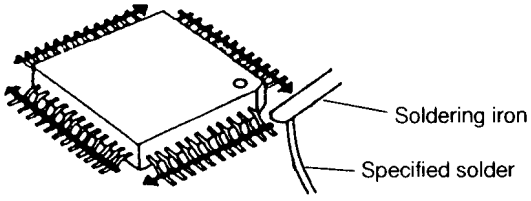
● - - - - - - Temporary soldering point.

Be certain each pin is located over the correct pad on the PCB.

2. Apply flux to all of the pins on the IC.

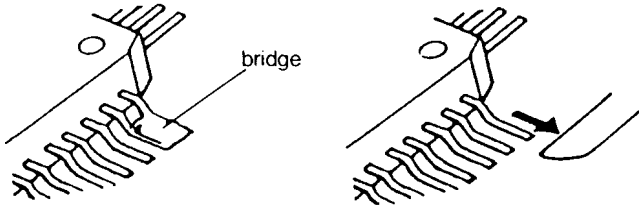


3. Being careful to not unsolder the tack points, slide the soldering iron along the tips of the pins while feeding enough solder to the tip so that it flows under the pins as they are heated.

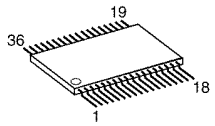
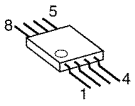
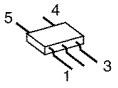
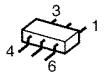
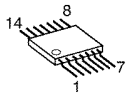


10.4. REMOVING SOLDER FROM BETWEEN PINS

1. Add a small amount of solder to the bridged pins.
2. With a hot iron, use a sweeping motion along the flat part of the pin to draw the solder from between the adjacent pads.



11 TERMINAL GUIDE OF ICS, TRANSISTORS AND DIODES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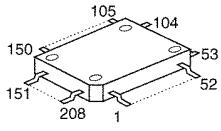	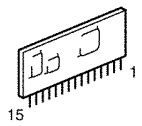	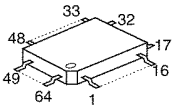	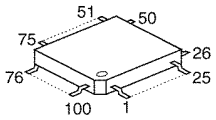	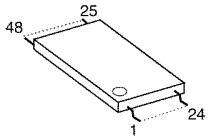
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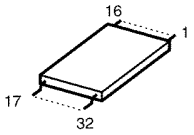	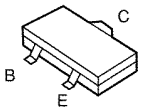	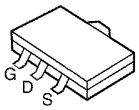	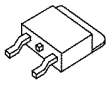	
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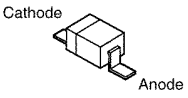
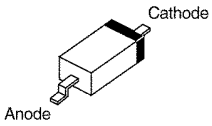
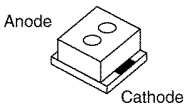
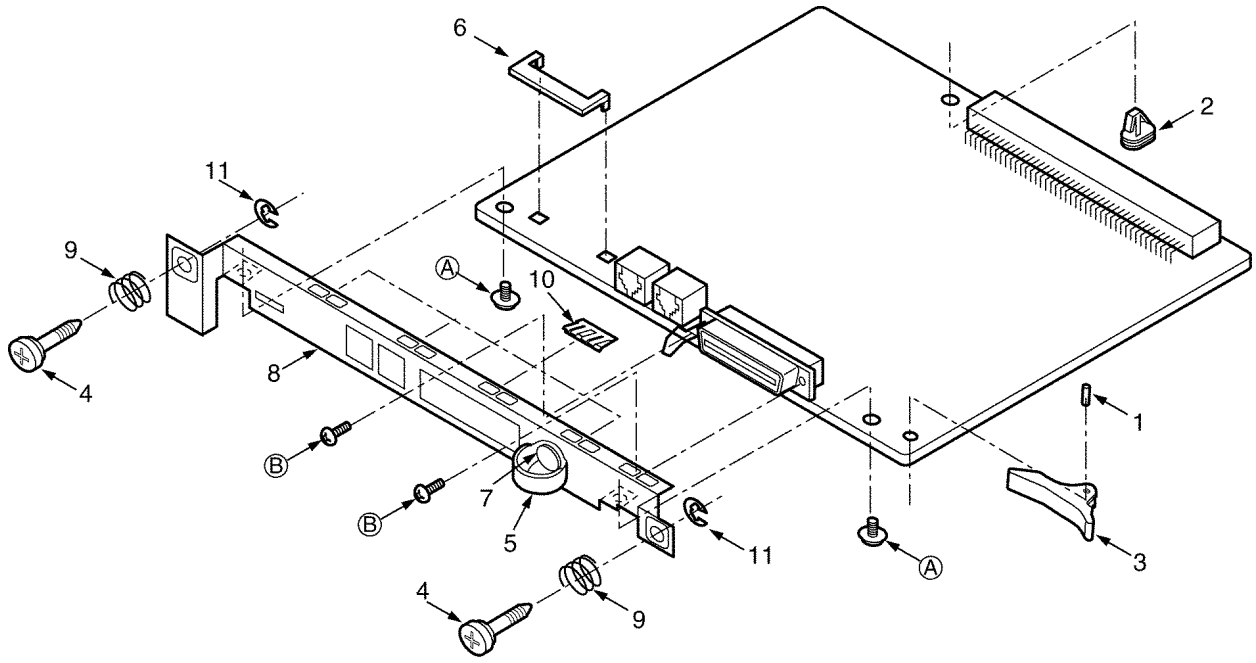
				
B1GHCFJJ0007	B1GFAFNN0001	MA8075 MA8051 B0JCND000009 MA110 MA8150	B0HCMR000002	PQVDBRPY1204

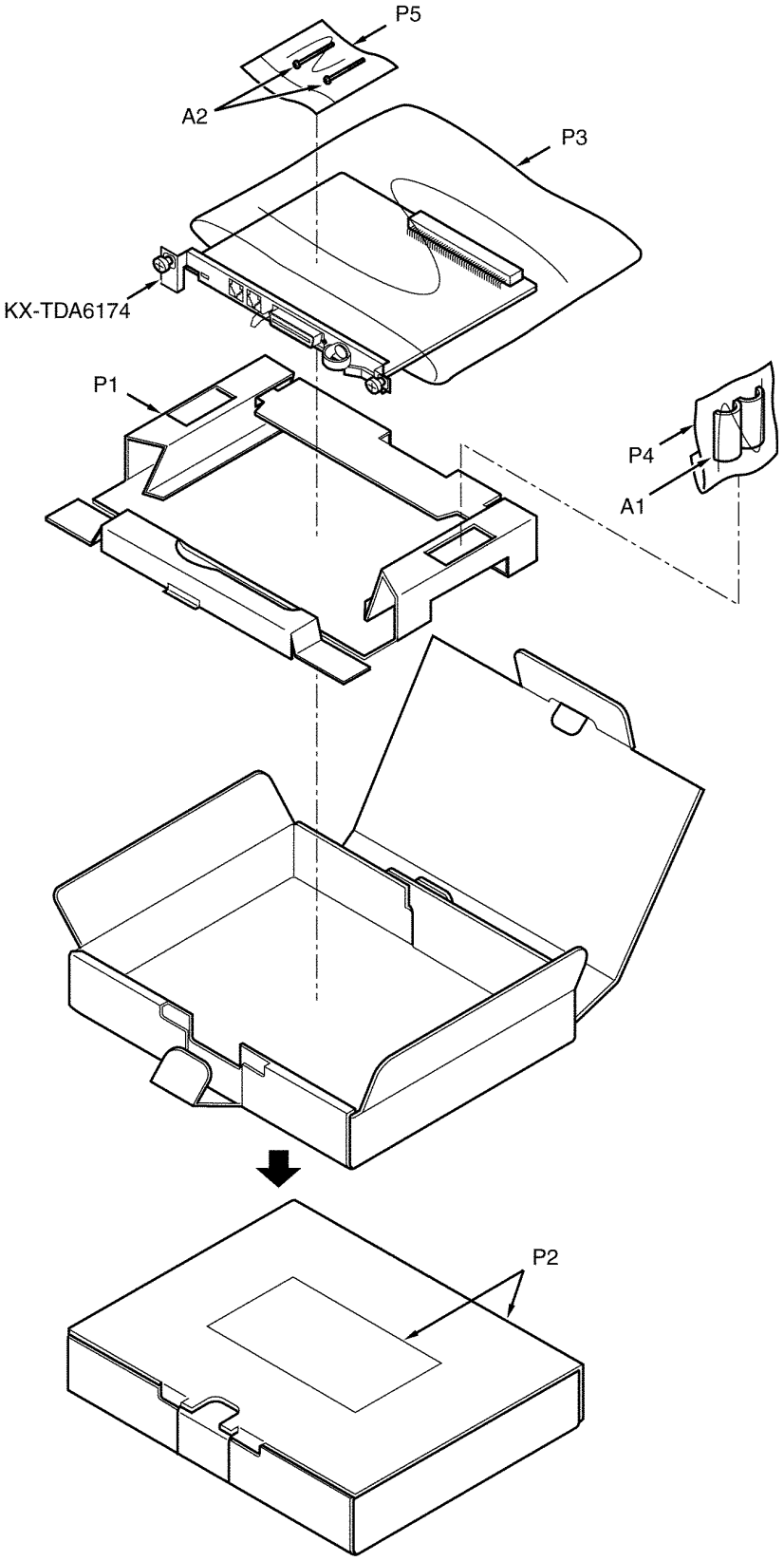
12 CABINET AND ELECTRICAL PARTS LOCATION



SCREW

Ref. No.	Part No.	Screw
A	XYN3+F6FJ	Φ 3 x 6 mm
B	XSN4X40+6FN	Φ 2.8 x 6 mm

13 ACCESSORIES AND PACKING MATERIALS



14 REPLACEMENT PARTS LIST

1. RTL (Retention Time Limited)

   Note: The marking (RTL) indicates that the Retention Time is limited for this item.

   After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is depends on the type of assembly, and in accordance with the laws governing parts and product retention.

   After end of this period, the assembly will no longer be available.

2. Important safety notice

   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacture´s specified parts.

3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.

4. ISO code (Example: ABS-94HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.

5. RESISTORS & CAPACITORS

   Unless otherwise specified;

   All resistors are in ohms (Ω) K=1000Ω, M=1000kΩ

   All capacitors are in MICRO FARADS (μF) P=μμF

   *Type & Wattage of Resistor

Type

ERC:Solid ERD:Carbon PQRD:Carbon	ERX:Metal Film ERG:Metal Oxide ER0:Metal Film	PQ4R:Carbon ERS:Fusible Resistor ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W

*Type & Voltage of Capacitor

Type

ECFD:Semi-Conductor ECQS:Styrol PQCUV:Chip ECQMS:Mica	ECCD,ECKD,ECBT,PQCBC:Ceramic ECQE,ECQV,ECQG:Polyester ECEA,ECSZ:Electrolytic ECQP:Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H:50V 2A:100V 2E:250V 2H:500V	05:50V 1:100V 2:200V	0F:3.15V 1A:10V 1V:35V 0J:6.3V	0J :6.3V 1A :10V 1C :16V 1E,25:25V	1V :35V 50,1H:50V 1J :63V 2A :100V

14.1. CABINET AND ELECTRICAL PARTS LOCATION

Ref. No.	Part No.	Part Name & Description	Remarks
1	PQDF996Z	SHAFT	
2	PQHR10005Z	SPACER	
3	PQUB14Z2	LEVER, EJECTOR	
4	PSHD1088Z	SCREW	
5	PSHE1106Z	TAPE	
6	PSHR1238Z	SPACER, PANEL LIGHT	
7	PSHR1272Z	REVET	
8	PSMH1212U	PANEL, FRONT	
9	PSUS1020Z	TORSION SPRING	
10	PSUS1021Y	TORSION SPRING	
11	XUC25VW	RETAINING RING	

14.2. ACCESSORIES AND PACKING MATERIALS

Ref. No.	Part No.	Part Name & Description	Remarks
A1	J0KG00000019	FILTER, CORE	
A2	XSN4X40+28FK	SCREW	
P1	PSPD1188X	CUSHION	
P2	PSZKDA6174XJ	GIFT BOX (KX-TDA6174XJ)	
P2	PSZKDA6174XU	GIFT BOX (KX-TDA6174X)	
P3	PSPP1069Z	PROTECTION COVER	
P4	PSPP1077Z	PROTECTION COVER	
P5	XZB05X08A03	PROTECTION COVER	

14.3. MAIN BOARD PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
		(ICS)	
IC1	C1CB00001561	IC	
IC2	C1CB00001561	IC	
IC4	C1CB00001561	IC	
IC5	C0JBAB000535	IC	
IC6	C1CB00001561	IC	
IC7	C0DBAHZ00012	IC	
IC9	PSVIPST596CN	IC	
IC10	C0DBAGZ00029	IC	
IC11	C0ABCB000050	IC	
IC12	C0ABCB000050	IC	
IC14	C1CB00001980	IC	
IC200A	EHDHA1846A	IC	
IC200B	EHDHA1846A	IC	
IC200C	EHDHA1846A	IC	
IC200D	EHDHA1846A	IC	
IC200E	EHDHA1846A	IC	
IC200F	EHDHA1846A	IC	
IC200G	EHDHA1846A	IC	
IC200H	EHDHA1846A	IC	
IC200I	EHDHA1846A	IC	
IC200J	EHDHA1846A	IC	
IC200K	EHDHA1846A	IC	
IC200L	EHDHA1846A	IC	
IC200M	EHDHA1846A	IC	
IC200N	EHDHA1846A	IC	
IC200O	EHDHA1846A	IC	
IC200P	EHDHA1846A	IC	
IC201	C1CB00001432	IC	
IC202	C1CB00001432	IC	
IC203	C0ABBB000179	IC	
IC250	C1CB00001432	IC	
IC251	C1CB00001432	IC	
IC252	C0ABBB000179	IC	
IC601	C2CBYE000011	IC	
IC602	PSWIDA6174XJ	IC	
IC603	C3BBHC000368	IC	
IC604	C1CB00001775	IC	
IC800	C0DBZZB00005	IC	
IC801	C0DBAJD00003	IC	
		(TRANSISTORS)	
Q11	PQVTDTA114EU	TRANSISTOR(SI)	S
Q12	B1DHCD000018	TRANSISTOR(SI)	
Q13	B1DHCD000018	TRANSISTOR(SI)	
Q14	B1DFDC000002	TRANSISTOR(SI)	
Q201A	PQVTDTC143E	TRANSISTOR(SI)	S
Q202	PQVTDTC123E	TRANSISTOR(SI)	S
Q600	PQVTDTC114YU	TRANSISTOR(SI)	S

Ref. No.	Part No.	Part Name & Description	Remarks
Q800	2SC4081R	TRANSISTOR(SI)	S
Q801	2SB1218A	TRANSISTOR(SI)	S
Q802	2SC4081R	TRANSISTOR(SI)	S
Q803	2SB1218A	TRANSISTOR(SI)	S
Q804	B1BBAP000015	TRANSISTOR(SI)	
Q805	B1BDAP000013	TRANSISTOR(SI)	
Q806	B1BBAP000015	TRANSISTOR(SI)	
Q807	B1BDAP000013	TRANSISTOR(SI)	
Q810	B1DFBL000004	TRANSISTOR(SI)	
U1	B1GHCFJJ0007	TRANSISTOR(SI)	S
U800	B1GFAFNN0001	TRANSISTOR(SI)	S
		(DIODES)	
D10	MA8075	DIODE(SI)	S
D11	MA8051	DIODE(SI)	S
D12	B0JCND000009	DIODE(SI)	
D14	B0JCND000009	DIODE(SI)	
D15	B0JCND000009	DIODE(SI)	
D202A	MA110	DIODE(SI)	S
D203A	MA110	DIODE(SI)	S
D203B	MA110	DIODE(SI)	S
D203C	MA110	DIODE(SI)	S
D203D	MA110	DIODE(SI)	S
D203E	MA110	DIODE(SI)	S
D203F	MA110	DIODE(SI)	S
D203G	MA110	DIODE(SI)	S
D203H	MA110	DIODE(SI)	S
D203I	MA110	DIODE(SI)	S
D203J	MA110	DIODE(SI)	S
D203K	MA110	DIODE(SI)	S
D203L	MA110	DIODE(SI)	S
D203M	MA110	DIODE(SI)	S
D203N	MA110	DIODE(SI)	S
D203O	MA110	DIODE(SI)	S
D203P	MA110	DIODE(SI)	S
D204	MA110	DIODE(SI)	S
D800	MA8150	DIODE(SI)	S
D801	MA8150	DIODE(SI)	S
D802	MA8150	DIODE(SI)	S
D803	MA8150	DIODE(SI)	S
D805	MA8240	DIODE(SI)	S
D806	B0HCMR000002	DIODE(SI)	
D808	B0HCMR000002	DIODE(SI)	
LED1	PQVDBRPY1204	LED	S
		(CONNECTORS)	
CN1	K1KA90B00009	CONNECTOR, 90P	
CN200	K1FB150B0046	CONNECTOR, 150P	
		(COMPONENTS PARTS)	
RA1	D1H81034A024	RESISTOR ARRAY, 10K	
RA2	D1H81034A024	RESISTOR ARRAY, 10K	
RA3	D1H81034A024	RESISTOR ARRAY, 10K	
RA4	D1H81034A024	RESISTOR ARRAY, 10K	
RA5	D1H81034A024	RESISTOR ARRAY, 10K	
RA6	D1H81034A024	RESISTOR ARRAY, 10K	
RA7	D1H81034A024	RESISTOR ARRAY, 10K	
RA8	D1H81034A024	RESISTOR ARRAY, 10K	
RA9	D1H81034A024	RESISTOR ARRAY, 10K	
RA10	D1H81034A024	RESISTOR ARRAY, 10K	
RA11	D1H81034A024	RESISTOR ARRAY, 10K	
RA12	D1H81024A024	RESISTOR ARRAY, 1K	
RA13	D1H81034A024	RESISTOR ARRAY, 10K	
RA14	D1H81014A024	RESISTOR ARRAY, 100	
RA15	D1H84704A024	RESISTOR ARRAY, 47	
RA16	D1H81024A024	RESISTOR ARRAY, 1	
RA17	D1H84704A024	RESISTOR ARRAY, 47	
RA19	D1H81034A024	RESISTOR ARRAY, 10K	
RA20	D1H84704A024	RESISTOR ARRAY, 47	
RA21	D1H84704A024	RESISTOR ARRAY, 47	
RA22	D1H84704A024	RESISTOR ARRAY, 47	
RA23	D1H84704A024	RESISTOR ARRAY, 47	
RA24	D1H84704A024	RESISTOR ARRAY, 47	
RA25	D1H84704A024	RESISTOR ARRAY, 47	
RA26	D1H81034A024	RESISTOR ARRAY, 68	
RA27	D1H81034A024	RESISTOR ARRAY, 68	

Ref. No.	Part No.	Part Name & Description	Remarks
RA31	D1H81034A024	RESISTOR ARRAY, 10K	
RA32	D1H81034A024	RESISTOR ARRAY, 10K	
RA33	D1H81034A024	RESISTOR ARRAY, 10K	
RA34	D1H81034A024	RESISTOR ARRAY, 10K	
RA35	D1H81034A024	RESISTOR ARRAY, 10K	
RA36	D1H81034A024	RESISTOR ARRAY, 10K	
RA37	D1H81034A024	RESISTOR ARRAY, 10K	
RA38	D1H81034A024	RESISTOR ARRAY, 10K	
RA39	D1H81034A024	RESISTOR ARRAY, 10K	
RA40	D1H81034A024	RESISTOR ARRAY, 10K	
RA41	D1H81034A024	RESISTOR ARRAY, 10K	
RA42	D1H81034A024	RESISTOR ARRAY, 10K	
RA43	D1H81034A024	RESISTOR ARRAY, 10K	
RA44	D1H81034A024	RESISTOR ARRAY, 10K	
RA45	D1H81034A024	RESISTOR ARRAY, 10K	
RA46	D1H81034A024	RESISTOR ARRAY, 10K	
RA601	D1H81034A024	RESISTOR ARRAY, 10K	
RA602	D1H81034A024	RESISTOR ARRAY, 10K	
RA603	D1H81034A024	RESISTOR ARRAY, 10K	
RA604	D1H81034A024	RESISTOR ARRAY, 10K	
RA605	D1H86804A024	RESISTOR ARRAY, 68	
RA606	D1H86804A024	RESISTOR ARRAY, 68	
RA607	D1H86804A024	RESISTOR ARRAY, 68	
RA608	D1H86804A024	RESISTOR ARRAY, 68	
RA609	D1H81034A024	RESISTOR ARRAY, 10K	
RA610	D1H81024A024	RESISTOR ARRAY, 1	
RA611	D1H81024A024	RESISTOR ARRAY, 1	
RA612	D1H81024A024	RESISTOR ARRAY, 1	
RA613	D1H81024A024	RESISTOR ARRAY, 1	
RA614	D1H81034A024	RESISTOR ARRAY, 10K	
RA615	D1H81034A024	RESISTOR ARRAY, 10K	
RA616	D1H81034A024	RESISTOR ARRAY, 10K	
RA617	D1H81034A024	RESISTOR ARRAY, 10K	
RA618	D1H81034A024	RESISTOR ARRAY, 10K	
RA619	D1H81034A024	RESISTOR ARRAY, 10K	
RA620	D1H81034A024	RESISTOR ARRAY, 10K	
RA621	D1H81014A024	RESISTOR ARRAY, 100	
RA622	D1H81034A024	RESISTOR ARRAY, 10K	
RA623	D1H86804A024	RESISTOR ARRAY, 68	
RA624	D1H86804A024	RESISTOR ARRAY, 68	
RA625	D1H86804A024	RESISTOR ARRAY, 68	
RA626	D1H86804A024	RESISTOR ARRAY, 68	
RA627	D1H86804A024	RESISTOR ARRAY, 68	
RA628	D1H81034A024	RESISTOR ARRAY, 10K	
		(COILS)	
L7	G1A221C00004	COIL	
L10	G1B680MA0001	COIL	
		(CRYSTAL OSCILLATOR)	
X1	PSVCC0025GT	CRYSTAL OSCILLATOR	S
		(FILTERS)	
FIL2	J0HAAH000003	IC FILTER	
FIL4	J0HAAH000003	IC FILTER	
FLT602	J0HAAH000003	IC FILTER	
FLT603	J0HAAH000003	IC FILTER	
L35	PFVF2P600SG	CERAMIC FILTER	S
L36	PFVF2P600SG	CERAMIC FILTER	S
L101	J0JCC0000275	IC FILTER	
L102	J0JCC0000275	IC FILTER	
L601	J0JCC0000275	IC FILTER	
L602	J0JCC0000275	IC FILTER	
L603	J0JCC0000275	IC FILTER	
LA101	J0JAD0000036	IC FILTER	
LA102	J0JAD0000036	IC FILTER	
LA103	J0JAD0000036	IC FILTER	
LA104	J0JAD0000036	IC FILTER	
LA105	J0JAD0000036	IC FILTER	
LA106	J0JAD0000036	IC FILTER	
LA601	J0JAD0000036	IC FILTER	
LA602	J0JAD0000036	IC FILTER	
LA603	J0JAD0000036	IC FILTER	
LA604	J0JAD0000036	IC FILTER	
LA605	J0JAD0000036	IC FILTER	
LA606	J0JAD0000036	IC FILTER	

Ref. No.	Part No.	Part Name & Description	Remarks
LA607	J0JAD0000036	IC FILTER	
LA608	J0JAD0000036	IC FILTER	
LA609	J0JAD0000036	IC FILTER	
X601	H2D122500003	CERAMIC FILTER	
		(FUSES)	
IP1	K5H502Z00003	FUSE	
IP2	K5G102A00026	FUSE	
IP4	K5H751Z00003	FUSE	
IP5	K5H751Z00003	FUSE	
		(JACKS)	
CN201	K2LB104B0055	JACK	
CN202	K2LB104B0055	JACK	
		(TRANSFORMER)	
T800	G4D1A0000048	TRANSFORMER	
		(PHOTO ELECTRIC TRANSDUCERS)	
PC800	B3PBA0000297	PHOTO COUPER	⚠
PC803	B3PBA0000297	PHOTO COUPER	⚠
PC804	B3PBA0000297	PHOTO COUPER	⚠
		(RELAYS)	
RL200A	K6B2CGA00094	RELAY	⚠
RL200B	K6B2CGA00094	RELAY	⚠
RL200C	K6B2CGA00094	RELAY	⚠
RL200D	K6B2CGA00094	RELAY	⚠
RL201A	K6B2CGA00094	RELAY	⚠
RL202A	K6B2CGA00094	RELAY	⚠
RL202B	K6B2CGA00094	RELAY	⚠
RL202C	K6B2CGA00094	RELAY	⚠
RL202D	K6B2CGA00094	RELAY	⚠
RL202E	K6B2CGA00094	RELAY	⚠
RL202F	K6B2CGA00094	RELAY	⚠
RL202G	K6B2CGA00094	RELAY	⚠
RL202H	K6B2CGA00094	RELAY	⚠
RL202I	K6B2CGA00094	RELAY	⚠
RL202J	K6B2CGA00094	RELAY	⚠
RL202K	K6B2CGA00094	RELAY	⚠
RL202L	K6B2CGA00094	RELAY	⚠
RL202M	K6B2CGA00094	RELAY	⚠
RL202N	K6B2CGA00094	RELAY	⚠
RL202O	K6B2CGA00094	RELAY	⚠
RL202P	K6B2CGA00094	RELAY	⚠
		(VARISTORS)	
ZNR20A	D4EAB470A005	VARISTOR	
ZNR20B	D4EAB470A005	VARISTOR	
ZNR20C	D4EAB470A005	VARISTOR	
ZNR20D	D4EAB470A005	VARISTOR	
ZNR20E	D4EAB470A005	VARISTOR	
ZNR20F	D4EAB470A005	VARISTOR	
ZNR20G	D4EAB470A005	VARISTOR	
ZNR20H	D4EAB470A005	VARISTOR	
ZNR20I	D4EAB470A005	VARISTOR	
ZNR20J	D4EAB470A005	VARISTOR	
ZNR20K	D4EAB470A005	VARISTOR	
ZNR20L	D4EAB470A005	VARISTOR	
ZNR20M	D4EAB470A005	VARISTOR	
ZNR20N	D4EAB470A005	VARISTOR	
ZNR20O	D4EAB470A005	VARISTOR	
ZNR20P	D4EAB470A005	VARISTOR	
ZNR21A	D4EAB220A005	VARISTOR	
ZNR21B	D4EAB220A005	VARISTOR	
ZNR21C	D4EAB220A005	VARISTOR	
ZNR21D	D4EAB220A005	VARISTOR	
ZNR21E	D4EAB220A005	VARISTOR	
ZNR21F	D4EAB220A005	VARISTOR	
ZNR21G	D4EAB220A005	VARISTOR	
ZNR21H	D4EAB220A005	VARISTOR	
ZNR21I	D4EAB220A005	VARISTOR	
ZNR21J	D4EAB220A005	VARISTOR	
ZNR21K	D4EAB220A005	VARISTOR	
ZNR21L	D4EAB220A005	VARISTOR	
ZNR21M	D4EAB220A005	VARISTOR	
ZNR21N	D4EAB220A005	VARISTOR	
ZNR21O	D4EAB220A005	VARISTOR	
ZNR21P	D4EAB220A005	VARISTOR	

Ref. No.	Part No.	Part Name & Description	Remarks
ZNR23A	D4EAB470A005	VARISTOR	
ZNR23B	D4EAB470A005	VARISTOR	
ZNR23C	D4EAB470A005	VARISTOR	
ZNR23D	D4EAB470A005	VARISTOR	
ZNR23E	D4EAB470A005	VARISTOR	
ZNR23F	D4EAB470A005	VARISTOR	
ZNR23G	D4EAB470A005	VARISTOR	
ZNR23H	D4EAB470A005	VARISTOR	
ZNR23I	D4EAB470A005	VARISTOR	
ZNR23J	D4EAB470A005	VARISTOR	
ZNR23K	D4EAB470A005	VARISTOR	
ZNR23L	D4EAB470A005	VARISTOR	
ZNR23M	D4EAB470A005	VARISTOR	
ZNR23N	D4EAB470A005	VARISTOR	
ZNR23O	D4EAB470A005	VARISTOR	
ZNR23P	D4EAB470A005	VARISTOR	
		(CAPACITORS)	
C2	F1G1A1040006	0.1	
C4	F1G1A1040006	0.1	
C6	F1G1A1040006	0.1	
C8	F1G1A1040006	0.1	
C10	F1G1A1040006	0.1	
C12	F1G1A1040006	0.1	
C14	F1G1A1040006	0.1	
C16	F1G1A1040006	0.1	
C17	F1G1A1040006	0.1	
C18	F1G1A1040006	0.1	
C22	F1G1A1040006	0.1	
C24	F1G1A1040006	0.1	
C26	F1G1A1040006	0.1	
C28	F1G1A1040006	0.1	
C30	F1G1A1040006	0.1	
C32	F1G1A1040006	0.1	
C34	F1G1A1040006	0.1	
C36	F1G1A1040006	0.1	
C42	F1G1A1040006	0.1	
C45	F1G1A1040006	0.1	
C48	F1G1A1040006	0.1	
C49	F1G1H180A565	18	
C50	F1G1H180A565	18	
C51	EEVUD1A220MR	22	
C52	ECUV1E104ZFV	0.1	
C54	ECUV1A105ZFV	1	
C55	F1G1H103A573	0.01	
C56	ECUV1E104ZFV	0.1	
C58	ECUV1A105ZFV	1	
C59	F1G1H103A573	0.01	
C60	EEVUD0J331MP	330	
C62	F1G1A1040006	0.1	
C63	ECUV1E104ZFV	0.1	
C64	EEVUD1E680MP	68	
C65	ECUV1E104ZFV	0.1	
C66	EEVUD1E151MP	150	
C70	F2G1H1000010	1	
C71	ECUV1H104KBV	0.1	
C73	F1G1A1040006	0.1	
C74	ECUV1A105ZFV	1	
C76	ECUV1A105ZFV	1	
C78	ECUV1A105ZFV	1	
C80	ECUV1A105ZFV	1	
C82	F1G1A1040006	0.1	
C83	F1G1H103A573	0.01	
C84	F1G1H103A573	0.01	
C85	F1G1H103A573	0.01	
C86	F1G1H103A573	0.01	
C87	F1G1H103A573	0.01	
C88	F1G1H103A573	0.01	
C89	F1G1H103A573	0.01	
C90	F1G1H103A573	0.01	
C92	F1G1H103A573	0.01	
C93	F1G1H103A573	0.01	
C94	F1G1H103A573	0.01	
C95	F1G1H103A573	0.01	

Ref. No.	Part No.	Part Name & Description	Remarks
C96	F1G1H103A573	0.01	
C97	F1G1H103A573	0.01	
C98	F1G1H103A573	0.01	
C99	F1G1H103A573	0.01	
C100	F1G1H103A573	0.01	
C200A	ECA1HHG100	10P	S
C200B	ECA1HHG100	10P	S
C200C	ECA1HHG100	10P	S
C200D	ECA1HHG100	10P	S
C200E	ECA1HHG100	10P	S
C200F	ECA1HHG100	10P	S
C200G	ECA1HHG100	10P	S
C200H	ECA1HHG100	10P	S
C200I	ECA1HHG100	10P	S
C200J	ECA1HHG100	10P	S
C200K	ECA1HHG100	10P	S
C200L	ECA1HHG100	10P	S
C200M	ECA1HHG100	10P	S
C200N	ECA1HHG100	10P	S
C200O	ECA1HHG100	10P	S
C200P	ECA1HHG100	10P	S
C201A	F2J1H1000008	10	
C201B	F2J1H1000008	10	
C201C	F2J1H1000008	10	
C201D	F2J1H1000008	10	
C201E	F2J1H1000008	10	
C201F	F2J1H1000008	10	
C201G	F2J1H1000008	10	
C201H	F2J1H1000008	10	
C201I	F2J1H1000008	10	
C201J	F2J1H1000008	10	
C201K	F2J1H1000008	10	
C201L	F2J1H1000008	10	
C201M	F2J1H1000008	10	
C201N	F2J1H1000008	10	
C201O	F2J1H1000008	10	
C201P	F2J1H1000008	10	
C202A	F2J1H4R70009	4.7	
C202B	F2J1H4R70009	4.7	
C202C	F2J1H4R70009	4.7	
C202D	F2J1H4R70009	4.7	
C202E	F2J1H4R70009	4.7	
C202F	F2J1H4R70009	4.7	
C202G	F2J1H4R70009	4.7	
C202H	F2J1H4R70009	4.7	
C202I	F2J1H4R70009	4.7	
C202J	F2J1H4R70009	4.7	
C202K	F2J1H4R70009	4.7	
C202L	F2J1H4R70009	4.7	
C202M	F2J1H4R70009	4.7	
C202N	F2J1H4R70009	4.7	
C202O	F2J1H4R70009	4.7	
C202P	F2J1H4R70009	4.7	
C203	F1G1C104A083	0.1	
C203A	ECUV1E104ZFV	0.1	
C203B	ECUV1E104ZFV	0.1	
C203C	ECUV1E104ZFV	0.1	
C203D	ECUV1E104ZFV	0.1	
C203E	ECUV1E104ZFV	0.1	
C203F	ECUV1E104ZFV	0.1	
C203G	ECUV1E104ZFV	0.1	
C203H	ECUV1E104ZFV	0.1	
C203I	ECUV1E104ZFV	0.1	
C203J	ECUV1E104ZFV	0.1	
C203K	ECUV1E104ZFV	0.1	
C203L	ECUV1E104ZFV	0.1	
C203M	ECUV1E104ZFV	0.1	
C203N	ECUV1E104ZFV	0.1	
C203O	ECUV1E104ZFV	0.1	
C203P	ECUV1E104ZFV	0.1	
C204	ECUV1C224ZFV	0.22	
C204A	ECUV1E104ZFV	0.1	
C204B	ECUV1E104ZFV	0.1	

Ref. No.	Part No.	Part Name & Description	Remarks
C204C	ECUV1E104ZFV	0.1	
C204D	ECUV1E104ZFV	0.1	
C204E	ECUV1E104ZFV	0.1	
C204F	ECUV1E104ZFV	0.1	
C204G	ECUV1E104ZFV	0.1	
C204H	ECUV1E104ZFV	0.1	
C204I	ECUV1E104ZFV	0.1	
C204J	ECUV1E104ZFV	0.1	
C204K	ECUV1E104ZFV	0.1	
C204L	ECUV1E104ZFV	0.1	
C204M	ECUV1E104ZFV	0.1	
C204N	ECUV1E104ZFV	0.1	
C204O	ECUV1E104ZFV	0.1	
C204P	ECUV1E104ZFV	0.1	
C205	F1G1C104A083	0.1	
C206	F1G1C104A083	0.1	
C207	F1G1C104A083	0.1	
C208	F1G1C104A083	0.1	
C209	ECUV1A105ZFV	1	
C210	ECUV1A105ZFV	1	
C211	ECUV1C224ZFV	0.22	
C212	F1G1C104A083	0.1	
C213	F1G1C104A083	0.1	
C214	F1G1C104A083	0.1	
C215	F1G1C104A083	0.1	
C216	ECUV1A105ZFV	1	
C217	ECUV1A105ZFV	1	
C219	ECUV1A105ZFV	1	
C221	F1G1A1040006	0.1	
C222	F1G1A1040006	0.1	
C223	F1G1A1040006	0.1	
C224	F1G1A1040006	0.1	
C225	F1G1A1040006	0.1	
C226	F1G1A1040006	0.1	
C227	F1G1A1040006	0.1	
C228	F1G1A1040006	0.1	
C250	F1G1C104A083	0.1	
C251	ECUV1C224ZFV	0.22	
C252	F1G1C104A083	0.1	
C253	F1G1C104A083	0.1	
C254	F1G1C104A083	0.1	
C255	F1G1C104A083	0.1	
C256	ECUV1A105ZFV	1	
C257	ECUV1A105ZFV	1	
C258	ECUV1C224ZFV	0.22	
C259	F1G1C104A083	0.1	
C260	F1G1C104A083	0.1	
C261	F1G1C104A083	0.1	
C262	F1G1C104A083	0.1	
C263	ECUV1A105ZFV	1	
C264	ECUV1A105ZFV	1	
C266	ECUV1A105ZFV	1	
C268	F1G1A1040006	0.1	
C269	F1G1A1040006	0.1	
C270	F1G1A1040006	0.1	
C271	F1G1A1040006	0.1	
C272	F1G1A1040006	0.1	
C273	F1G1A1040006	0.1	
C274	F1G1A1040006	0.1	
C275	F1G1A1040006	0.1	
C601	ECUV1A105ZFV	1	
C602	F1G1H103A573	0.01	
C603	ECUV1A105ZFV	1	
C604	F1G1H103A573	0.01	
C605	F1G1H103A573	0.01	
C606	ECUV1A105ZFV	1	
C607	F1G1H103A573	0.01	
C608	F1G1H103A573	0.01	
C609	F1G1H103A573	0.01	
C610	F1G1H103A573	0.01	
C611	F1G1H103A573	0.01	
C612	F1G1H103A573	0.01	
C613	ECUV1A105ZFV	1	

Ref. No.	Part No.	Part Name & Description	Remarks
C621	F1G1H103A573	0.01	
C622	F1G1H103A573	0.01	
C623	F1G1H103A573	0.01	
C624	F1G1H103A573	0.01	
C625	F1G1H103A573	0.01	
C626	F1G1H103A573	0.01	
C627	F1G1H103A573	0.01	
C628	F1G1H103A573	0.01	
C629	F1G1H103A573	0.01	
C630	F1G1H103A573	0.01	
C631	F1G1H103A573	0.01	
C632	F1G1H103A573	0.01	
C633	F1G1H103A573	0.01	
C634	F1G1H103A573	0.01	
C635	F1G1H103A573	0.01	
C636	F1G1H103A573	0.01	
C637	F1G1H103A573	0.01	
C638	F1G1H103A573	0.01	
C639	F1G1H103A573	0.01	
C640	F1G1H103A573	0.01	
C641	F1G1E221A090	220	
C642	F1G1E221A090	220	
C643	F1G1E221A090	220	
C644	F1G1E221A090	220	
C645	F1G1E221A090	220	
C646	F1G1E221A090	220	
C647	F1G1E221A090	220	
C648	F1G1E221A090	220	
C649	F1G1E221A090	220	
C650	F1G1E221A090	220	
C651	F1G1E221A090	220	
C652	F1G1E221A090	220	
C653	F1G1E221A090	220	
C654	F1G1E221A090	220	
C655	F1G1E221A090	220	
C656	F1G1E221A090	220	
C657	F1G1E221A090	220	
C658	F1G1E221A090	220	
C659	F1G1E221A090	220	
C660	F1G1E221A090	220	
C800	PSCUV2EY104K	0.1	S
C801	PSCUV2EY104K	0.1	S
C802	ECUV1E104ZFV	0.1	
C803	ECUV1E104ZFV	0.1	
C804	PQCUV1E823KB	0.082	S
C805	PQCUV1E823KB	0.082	S
C806	PQCUV1E823KB	0.082	S
C807	PQCUV1E823KB	0.082	S
C808	ECUV1E104ZFV	0.1	
C809	ECA2EHG100	10P	
C811	ECA2EHG100	10P	
C812	ECUV1C473KBV	0.047	
C813	ECUV1E104ZFV	0.1	
C814	ECJ1VC1H471J	470P	
C815	ECUV1E104ZFV	0.1	
C816	ECUV1E104ZFV	0.1	
C817	ECA1HHG101	100P	
C818	ECUV1E104ZFV	0.1	
		(RESISTORS)	
J1	ERJ2GEJ000	0	S
J2	ERJ2GEJ000	0	S
J7	ERJ2GEJ000	0	S
J8	ERJ2GEJ000	0	S
J9	ERJ2GEJ000	0	S
J10	ERJ2GEJ000	0	S
J11	ERJ2GEJ000	0	S
J12	ERJ2GEJ000	0	S
J13	ERJ2GEJ000	0	S
J14	PQ4R18XJ000	0	S
J15	PQ4R18XJ000	0	S
J16	PQ4R18XJ000	0	S
J18	ERJ2GEJ000	0	S
J19	ERJ2GEJ000	0	S

Ref. No.	Part No.	Part Name & Description	Remarks
J20	ERJ2GEJ000	0	S
J26	ERJ2GEJ000	0	S
J28	ERJ2GEJ000	0	S
J31	ERJ2GEJ000	0	S
J34	ERJ2GEJ000	0	S
J37	ERJ2GEJ000	0	S
J38	ERJ2GEJ000	0	S
J40	ERJ2GEJ000	0	S
J51	ERJ3GEY0R00	0	
J52	ERJ3GEY0R00	0	
J202A	ERJ3GEY0R00	0	
J202B	ERJ3GEY0R00	0	
J202C	ERJ3GEY0R00	0	
J202D	ERJ3GEY0R00	0	
J202E	ERJ3GEY0R00	0	
J202F	ERJ3GEY0R00	0	
J202G	ERJ3GEY0R00	0	
J202H	ERJ3GEY0R00	0	
J202I	ERJ3GEY0R00	0	
J202J	ERJ3GEY0R00	0	
J202K	ERJ3GEY0R00	0	
J202L	ERJ3GEY0R00	0	
J202M	ERJ3GEY0R00	0	
J202N	ERJ3GEY0R00	0	
J202O	ERJ3GEY0R00	0	
J202P	ERJ3GEY0R00	0	
J602	ERJ2GEJ000	0	S
J603	ERJ2GEJ000	0	S
J604	ERJ2GEJ000	0	S
J605	ERJ2GEJ000	0	S
J607	ERJ2GEJ000	0	S
J801	ERJ3GEY0R00	0	
J802	ERJ3GEY0R00	0	
J803	ERJ3GEY0R00	0	
J804	ERJ3GEY0R00	0	
L5	ERJ3GEY0R00	0	
L8	ERJ3GEY0R00	0	
R12	ERJ2GEJ104	100K	S
R14	ERJ2GEJ104	100K	S
R16	ERJ2GEJ104	100K	S
R18	ERJ2GEJ104	100K	S
R20	ERJ2GEJ104	100K	S
R22	ERJ2GEJ104	100K	S
R24	ERJ2GEJ104	100K	S
R26	ERJ2GEJ104	100K	S
R31	ERJ2GEJ104	100K	S
R33	ERJ2GEJ104	100K	S
R35	ERJ2GEJ104	100K	S
R37	ERJ2GEJ104	100K	S
R41	ERJ2GEJ104	100K	S
R43	ERJ2GEJ104	100K	S
R45	ERJ2GEJ104	100K	S
R47	ERJ2GEJ104	100K	S
R66	ERJ2GEJ104	100K	S
R68	ERJ2GEJ104	100K	S
R70	ERJ2GEJ104	100K	S
R72	ERJ2GEJ104	100K	S
R76	ERJ2GEJ104	100K	S
R78	ERJ2GEJ104	100K	S
R80	ERJ2GEJ104	100K	S
R82	ERJ2GEJ104	100K	S
R85	ERJ2GEJ104	100K	S
R87	ERJ2GEJ104	100K	S
R89	ERJ2GEJ104	100K	S
R91	ERJ2GEJ104	100K	S
R94	ERJ2GEJ104	100K	S
R96	ERJ2GEJ104	100K	S
R98	ERJ2GEJ104	100K	S
R100	ERJ2GEJ104	100K	S
R109	ERJ2GEJ105X	1M	S
R118	D0GA272JA021	2.7K	
R119	ERJ2GEYJ151	150	S
R120	ERJ2GEYJ151	150	S

Ref. No.	Part No.	Part Name & Description	Remarks
R121	ERJ2GEYJ103	10K	S
R122	ERJ2GEJ221	220	S
R132	ERJ2GEYJ103	10K	S
R134	ERJ3GEYJ560	56	
R140	ERJ3GEYJ560	56	
R149	ERJ2GEJ220	22	S
R150	ERJ2GEJ220	22	S
R152	ERJ2GEJ220	22	S
R153	ERJ2GEJ220	22	S
R154	ERJ2GEJ220	22	S
R155	ERJ2GEJ220	22	S
R160	ERJ2GEJ221	220	S
R161	PQ4R18XJ223	22K	S
R162	ERJ2GEYJ102	1K	S
R171	ERJ2GEJ101	100	S
R172	ERJ2GEJ101	100	S
R180	ERJ2GEYJ103	10K	S
R202A	ERJ3GEYJ333	33K	
R202B	ERJ3GEYJ333	33K	
R202C	ERJ3GEYJ333	33K	
R202D	ERJ3GEYJ333	33K	
R202E	ERJ3GEYJ333	33K	
R202F	ERJ3GEYJ333	33K	
R202G	ERJ3GEYJ333	33K	
R202H	ERJ3GEYJ333	33K	
R202I	ERJ3GEYJ333	33K	
R202J	ERJ3GEYJ333	33K	
R202K	ERJ3GEYJ333	33K	
R202L	ERJ3GEYJ333	33K	
R202M	ERJ3GEYJ333	33K	
R202N	ERJ3GEYJ333	33K	
R202O	ERJ3GEYJ333	33K	
R202P	ERJ3GEYJ333	33K	
R203A	ERJ1WYJ102	1K	S
R203B	ERJ1WYJ102	1K	S
R203C	ERJ1WYJ102	1K	S
R203D	ERJ1WYJ102	1K	S
R203E	ERJ1WYJ102	1K	S
R203F	ERJ1WYJ102	1K	S
R203G	ERJ1WYJ102	1K	S
R203H	ERJ1WYJ102	1K	S
R203I	ERJ1WYJ102	1K	S
R203J	ERJ1WYJ102	1K	S
R203K	ERJ1WYJ102	1K	S
R203L	ERJ1WYJ102	1K	S
R203M	ERJ1WYJ102	1K	S
R203N	ERJ1WYJ102	1K	S
R203O	ERJ1WYJ102	1K	S
R203P	ERJ1WYJ102	1K	S
R206A	PQ4R10XJ221	220	S
R228	ERJ2GEJ104	100K	S
R231	ERJ2GEJ104	100K	S
R236	PQ4R18XJ000	0	S
R268	ERJ2GEJ104	100K	S
R271	ERJ2GEJ104	100K	S
R274	ERJ2GEJ101	100	S
R275	ERJ2GEJ101	100	S
R276	ERJ2GEJ101	100	S
R277	ERJ2GEJ101	100	S
R278	ERJ2GEJ101	100	S
R279	ERJ2GEJ101	100	S
R280	ERJ2GEJ101	100	S
R281	ERJ2GEJ101	100	S
R601	ERJ3GEYJ393	39K	
R602	ERJ2GEYJ103	10K	S
R603	D0GA680JA004	68	
R604	D0GA680JA004	68	
R605	ERJ2GEYJ103	10K	S
R606	ERJ2GEJ220	22	S
R607	ERJ2GEJ220	22	S
R800	ERJ3GEYJ151	150	
R801	ERJ3GEYJ151	150	
R802	ERJ3GEYJ681	680	

Ref. No.	Part No.	Part Name & Description	Remarks
R803	ERJ3GEYJ681	680	
R804	ERJ3GEYJ681	680	
R805	ERJ3GEYJ681	680	
R806	PQ4R10XJ101	100	S
R807	PQ4R10XJ101	100	S
R808	PQ4R10XJ473	47K	S
R809	PQ4R10XJ473	47K	S
R810	PQ4R10XJ473	47K	S
R811	PQ4R10XJ473	47K	S
R812	ERJ3GEYJ103	10K	
R813	ERJ3GEYJ103	10K	
R814	ERJ3GEYJ105	1M	
R815	ERJ3GEYJ105	1M	
R816	ERJ3GEYJ103	10K	
R817	ERJ3GEYJ103	10K	
R818	ERJ3GEYJ752	7.5K	
R819	ERJ3GEYJ752	7.5K	
R820	ERJ3GEYJ473	47K	
R821	ERJ3GEYJ473	47K	
R822	ERJ3EKF3903	390K	
R823	ERJ3EKF3903	390K	
R824	ERJ3EKF2002	20K	
R825	ERJ3EKF2002	20K	
R826	ERJ3EKF1803	180K	
R827	ERJ3EKF1803	180K	
R828	PQ4R10XJ472	4.7K	S
R829	ERJ3EKF2002	20K	
R830	ERJ3GEYF393	39K	S
R831	ERJ3EKF7500	750	
R832	ERJ3GEYJ125	1.2M	
R833	ERJ3GEYJ102	1K	
R834	ERJ3GEYJ223	22K	
R836	PQ4R18XJ473	47K	S
R837	ERJ3GEYJ103	10K	
R840	ERJ3GEYJ222	2.2K	
R841	ERJ3GEYJ220	22	
R842	ERJ3GEYJ223	22K	
R843	D0GR1R8JA001	1.8	
R844	ERJ3GEYJ220	22	
R845	PQ4R10XJ472	4.7K	S
R846	ERJ3GEYJ102	1K	
R847	ERJ3GEYJ123	12K	
R848	PQ4R10XJ101	100	S
R849	PQ4R10XJ101	100	S
R850	PQ4R18XJ223	22K	S
R851	PQ4R10XJ473	47K	S
R852	PQ4R10XJ473	47K	S
R853	PQ4R10XJ473	47K	S
R854	PQ4R10XJ473	47K	S
R855	ERJ3EKF7500	750	

15 FOR SCHEMATIC DIAGRAM

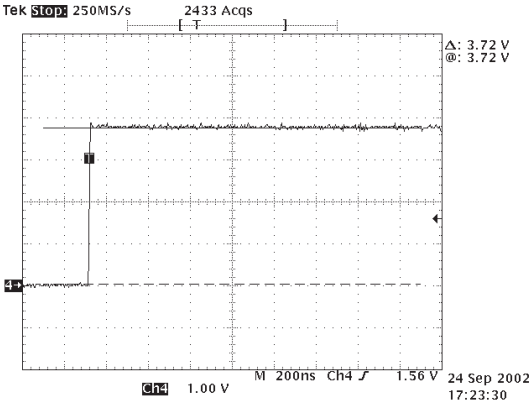
Note:

1. DC voltage measurements are taken with voltmeter from the negative voltage line.

Important Safety Notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

2. This schematic diagram may be modified at any time with the development of new technology.

15.1. WAVEFORM



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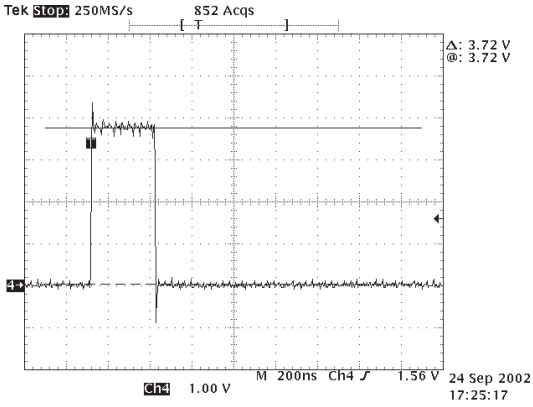

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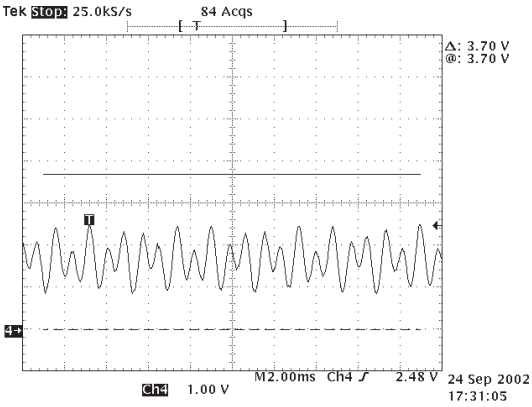

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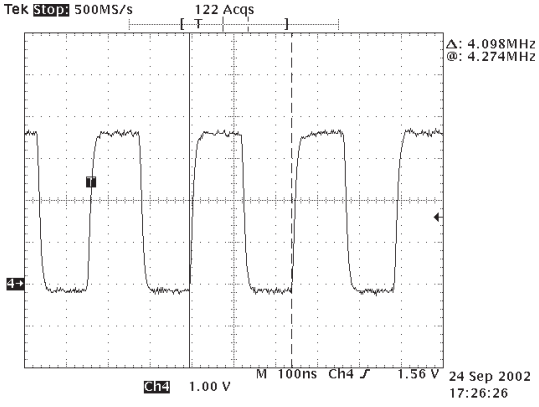

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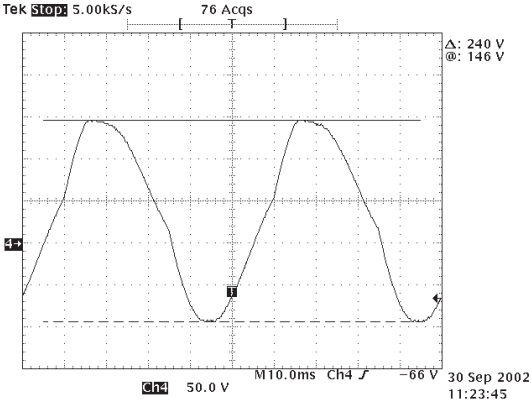

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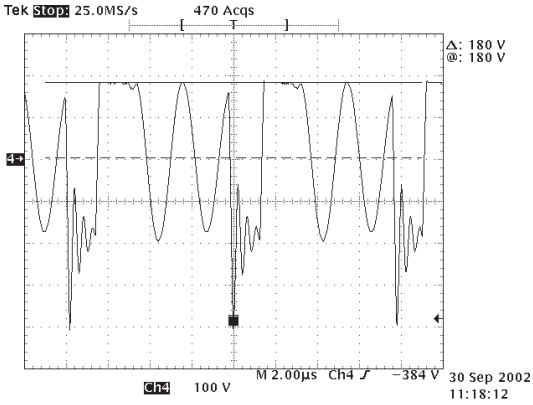

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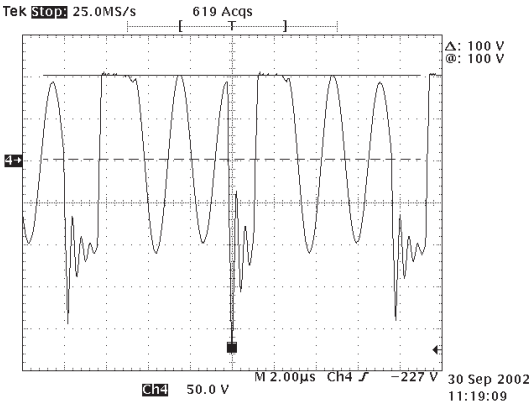

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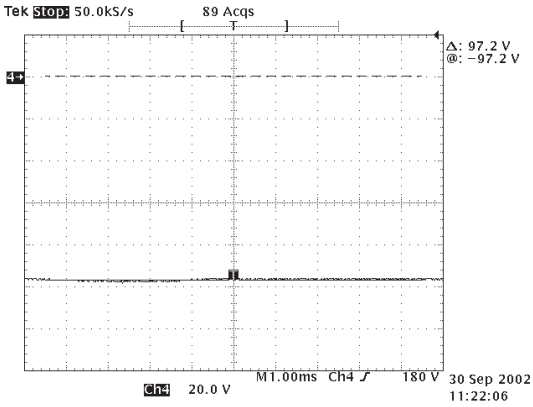

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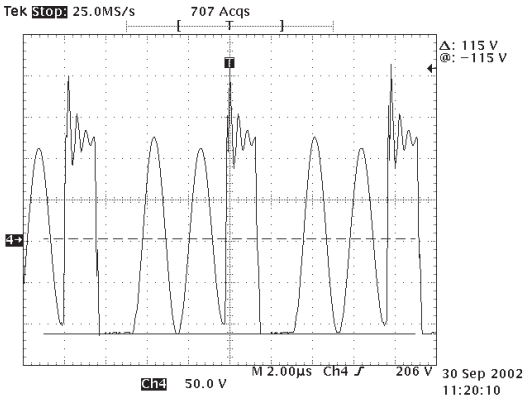
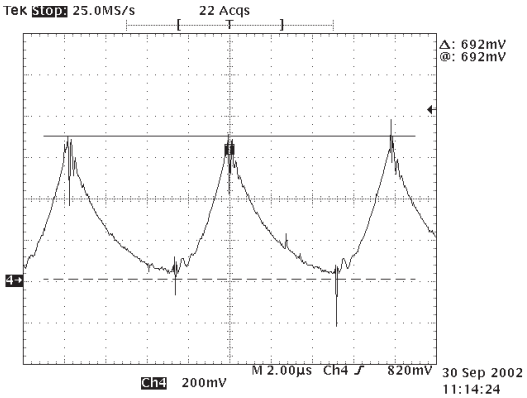
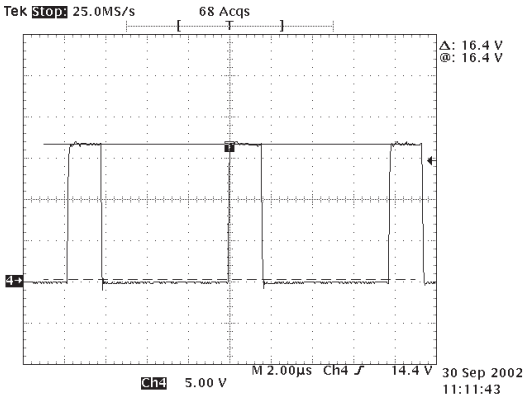

Tek Stop: 25.0MS/s 707 Acqs
Δ: 115 V
@: −115 V
M 2.00µs Ch4 ƒ 206 V
Ch4 50.0 V
30 Sep 2002
11:20:10

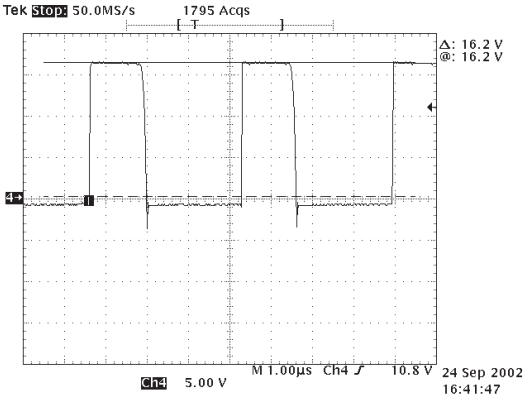
⑨


Tek Stop: 25.0MS/s 22 Acqs
Δ: 692mV
@: 692mV
M 2.00µs Ch4 ƒ 820mV
Ch4 200mV
30 Sep 2002
11:14:24

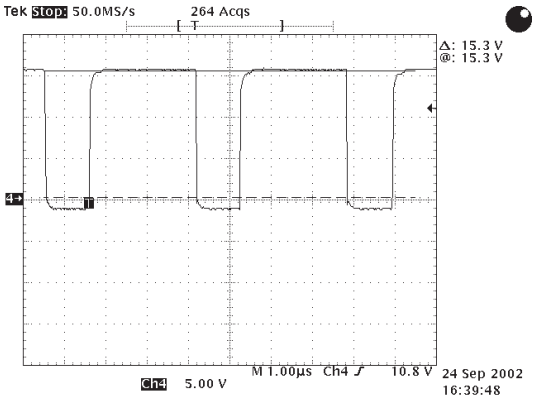
⑩


Tek Stop: 25.0MS/s 68 Acqs
Δ: 16.4 V
@: 16.4 V
M 2.00µs Ch4 ƒ 14.4 V
Ch4 5.00 V
30 Sep 2002
11:11:43

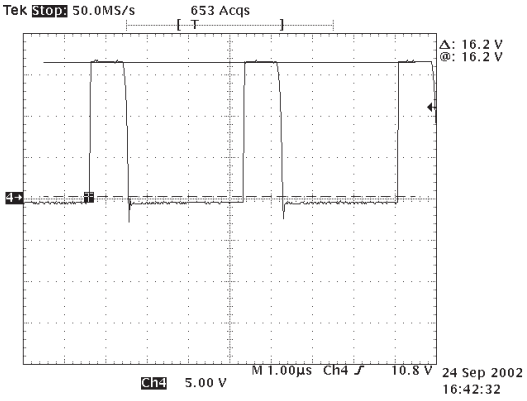
⑪


Tek Stop: 50.0MS/s 1795 Acqs
Δ: 16.2 V
@: 16.2 V
M 1.00µs Ch4 ƒ 10.8 V
Ch4 5.00 V
24 Sep 2002
16:41:47

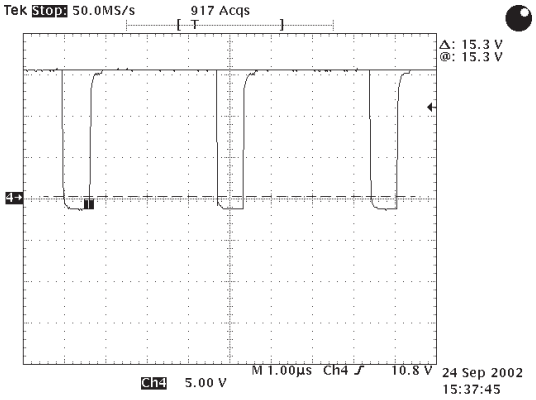
⑫


Tek Stop: 50.0MS/s 264 Acqs
Δ: 15.3 V
@: 15.3 V
M 1.00µs Ch4 ƒ 10.8 V
Ch4 5.00 V
24 Sep 2002
16:39:48

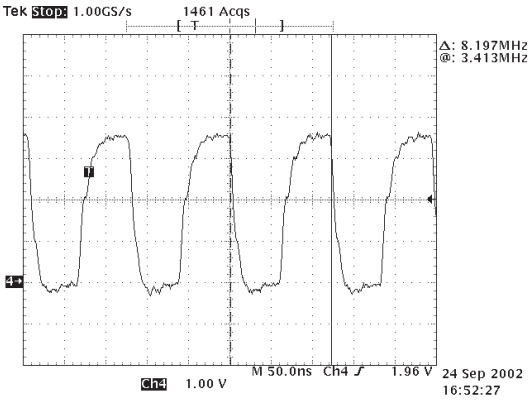
⑬


Tek Stop: 50.0MS/s 653 Acqs
Δ: 16.2 V
@: 16.2 V
M 1.00µs Ch4 ƒ 10.8 V
Ch4 5.00 V
24 Sep 2002
16:42:32

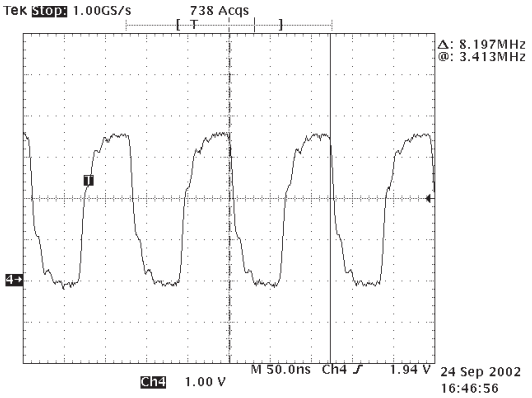
⑭


Tek Stop: 50.0MS/s 917 Acqs
Δ: 15.3 V
@: 15.3 V
M 1.00µs Ch4 ƒ 10.8 V
Ch4 5.00 V
24 Sep 2002
15:37:45

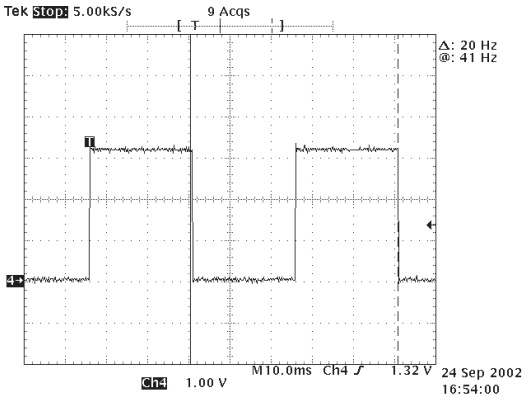
⑮


Tek Stop: 1.00GS/s 1461 Acqs
Δ: 8.197MHz
@: 3.413MHz
M 50.0ns Ch4 ƒ 1.96 V
Ch4 1.00 V
24 Sep 2002
16:52:27

⑯



17



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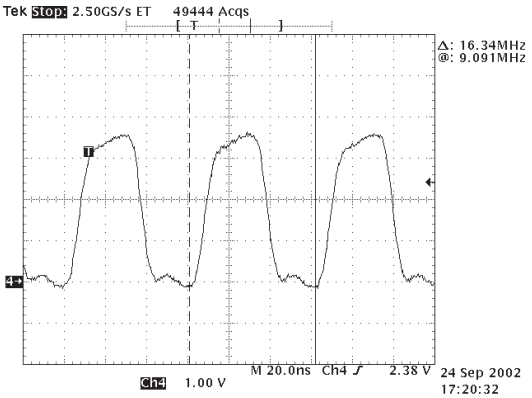
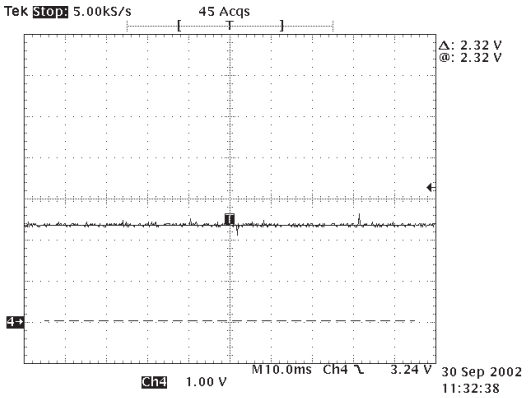


19



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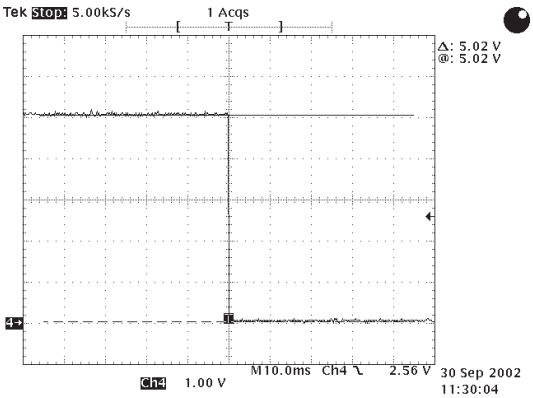

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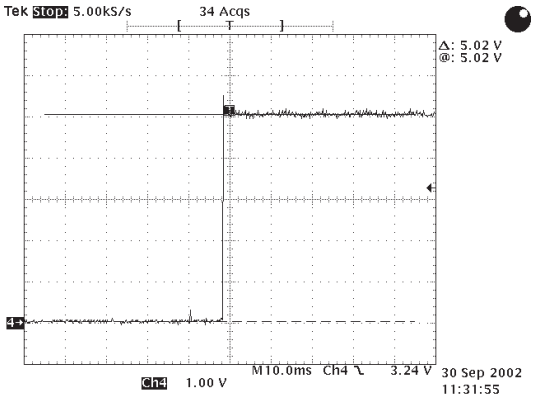

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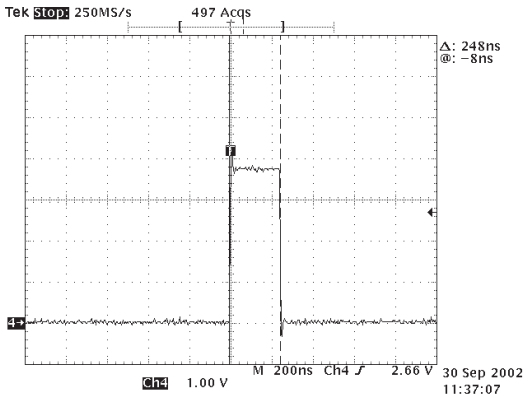
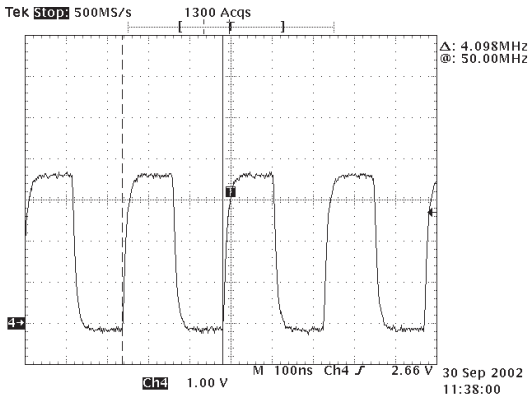
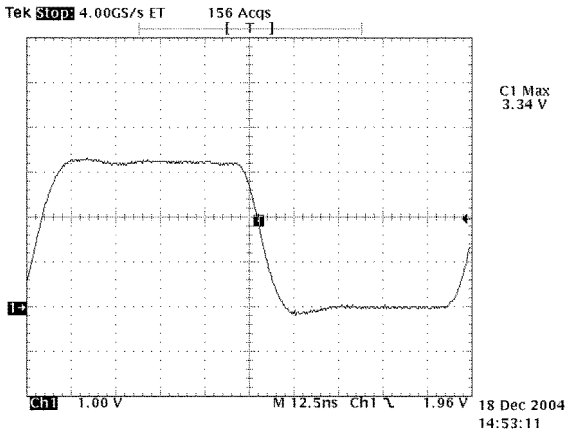


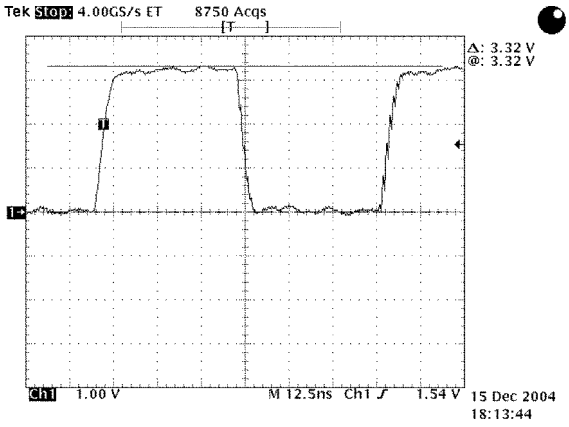
23



24

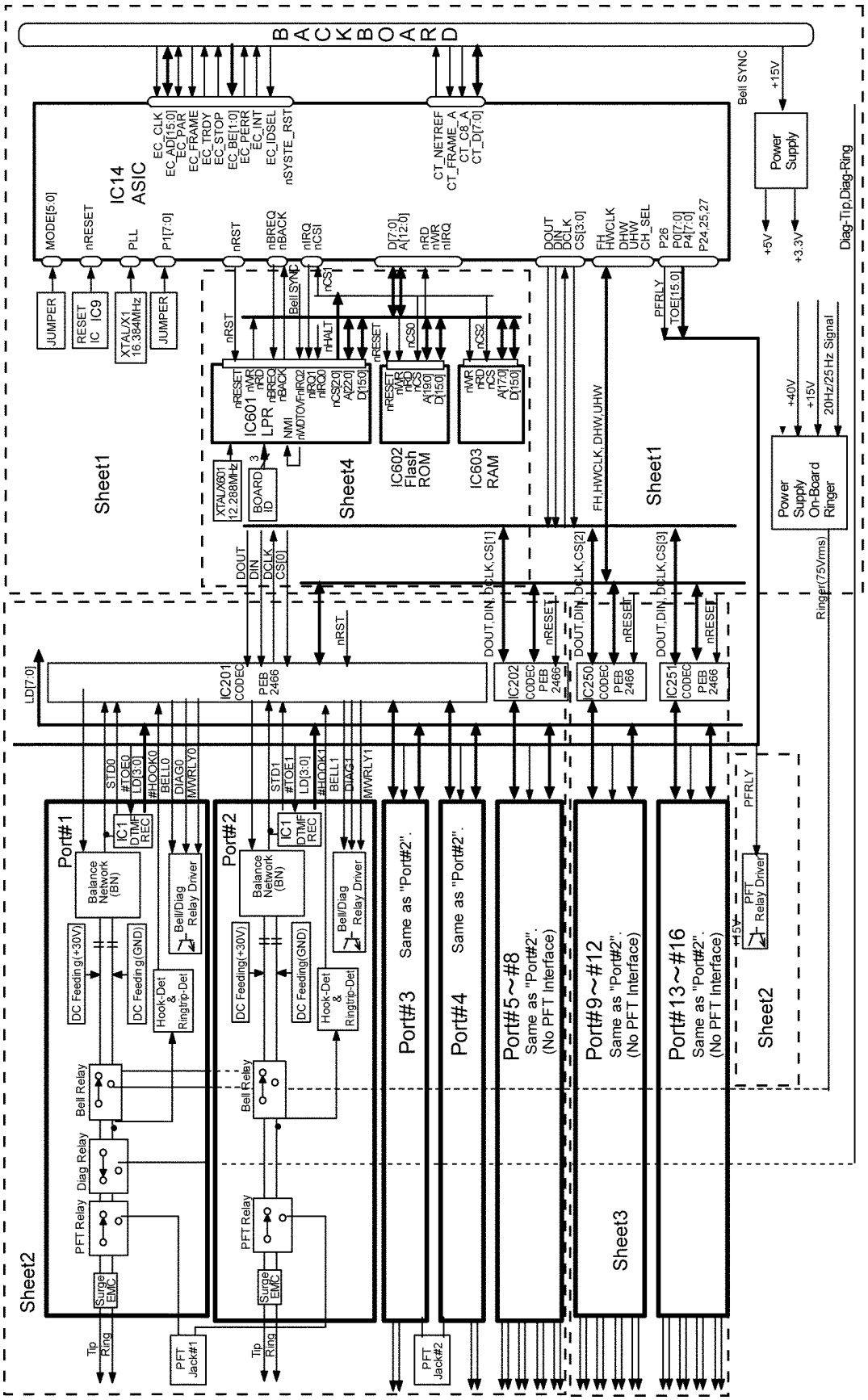

Tek Stop: 4.00GS/s ET 156 Acqs
C1 Max
3.34 V
Ch1 1.00 V M 12.5ns Ch1 1.96 V
18 Dec 2004
14:53:11

25


Tek Stop: 4.00GS/s ET 8750 Acqs
Δ: 3.32 V
@: 3.32 V
Ch1 1.00 V M 12.5ns Ch1 1.54 V
15 Dec 2004
18:13:44

26

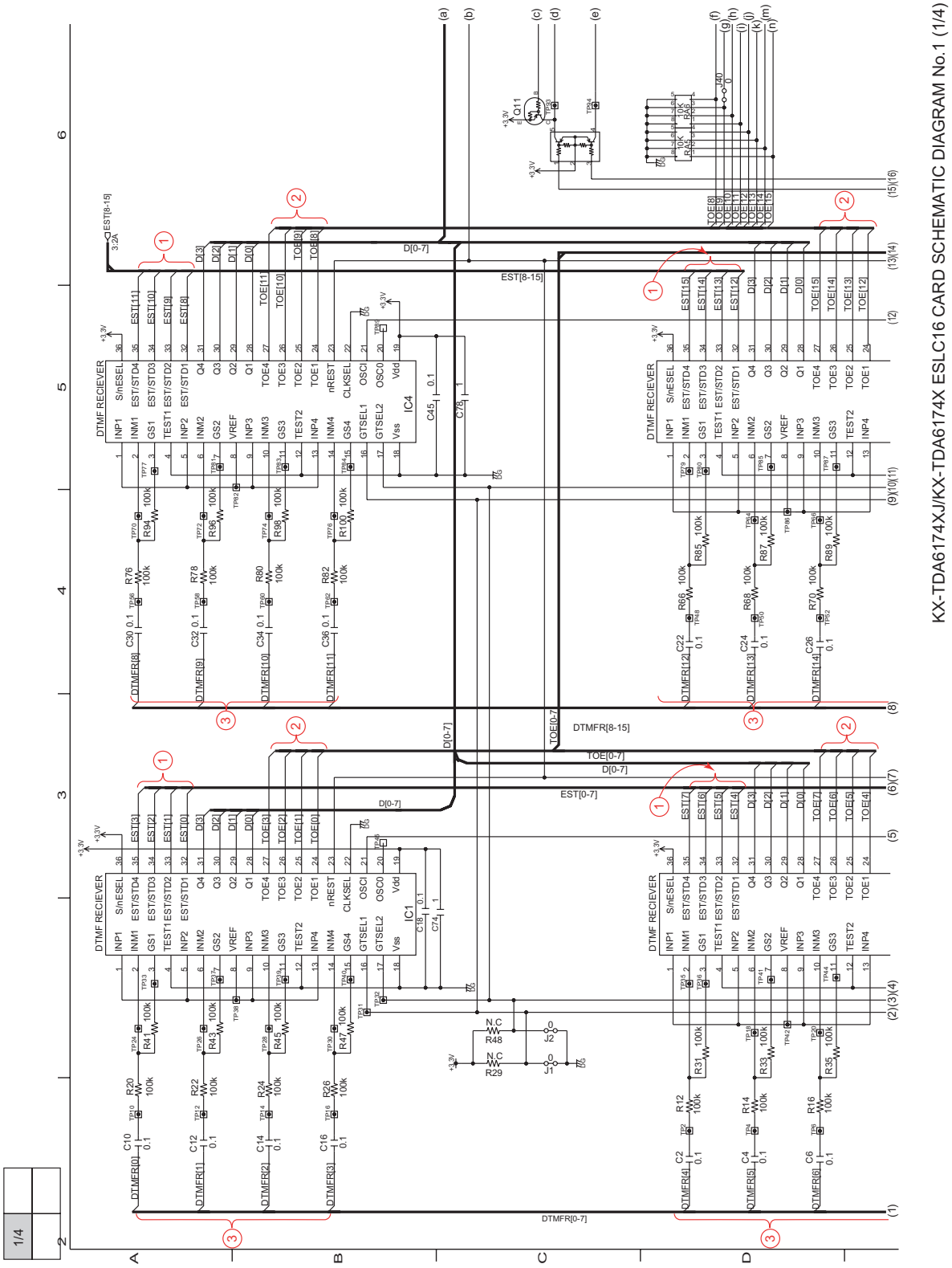
15.2. ESLC16 BLOCK DIAGRAM

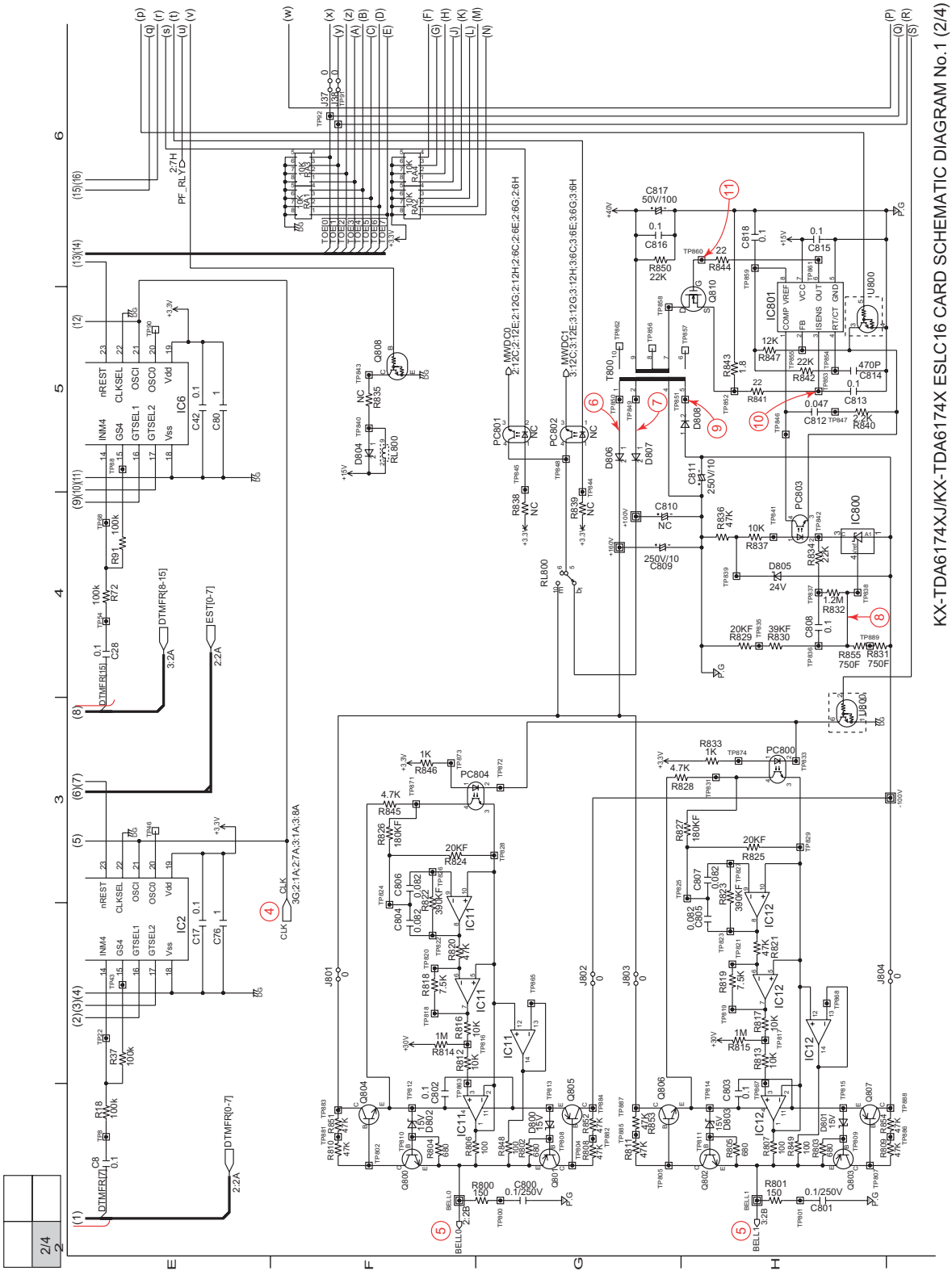


ESLC16 CARD BLOCK DIAGRAM

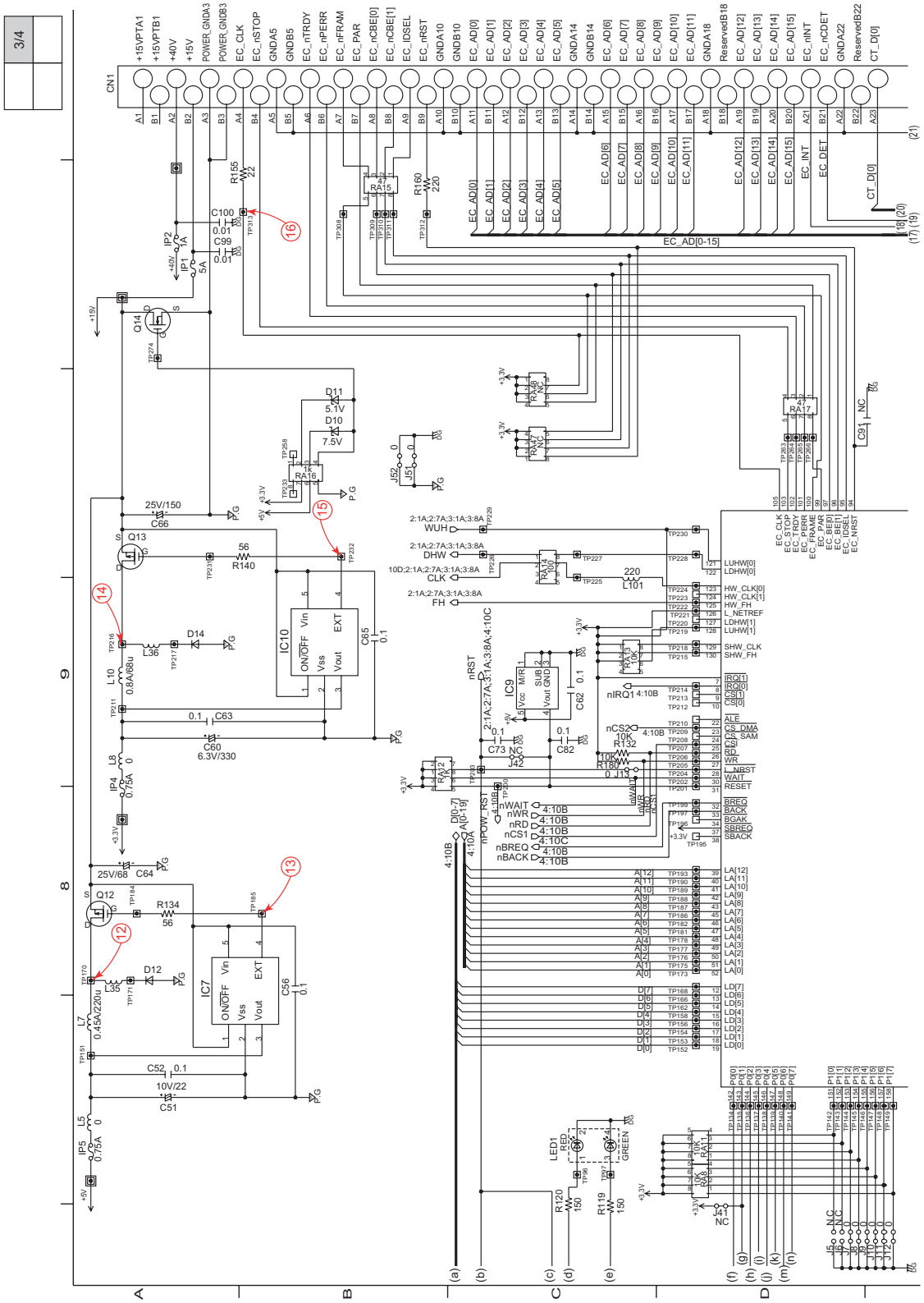
16 SCHEMATIC DIAGRAM

16.1. No.1

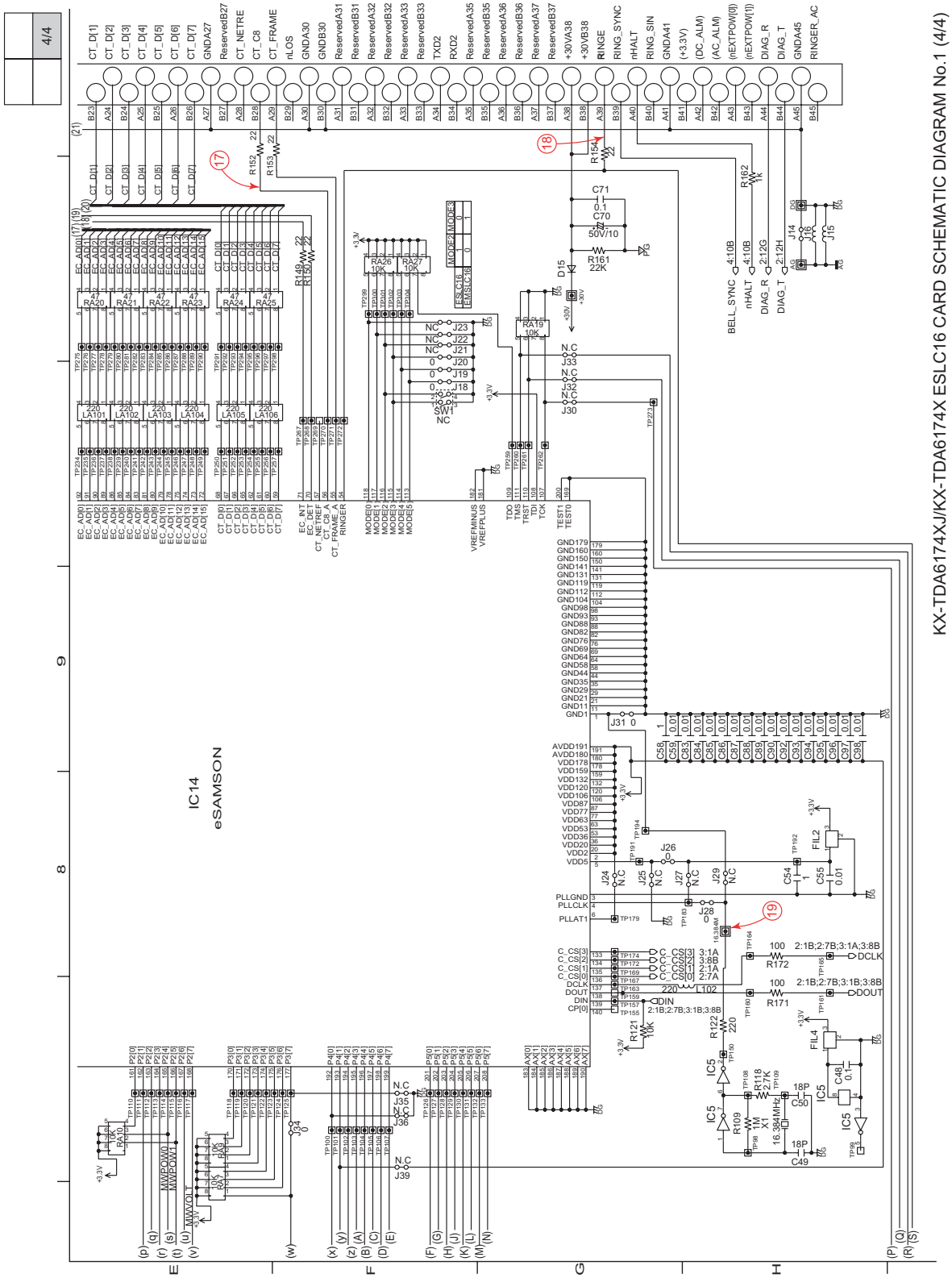




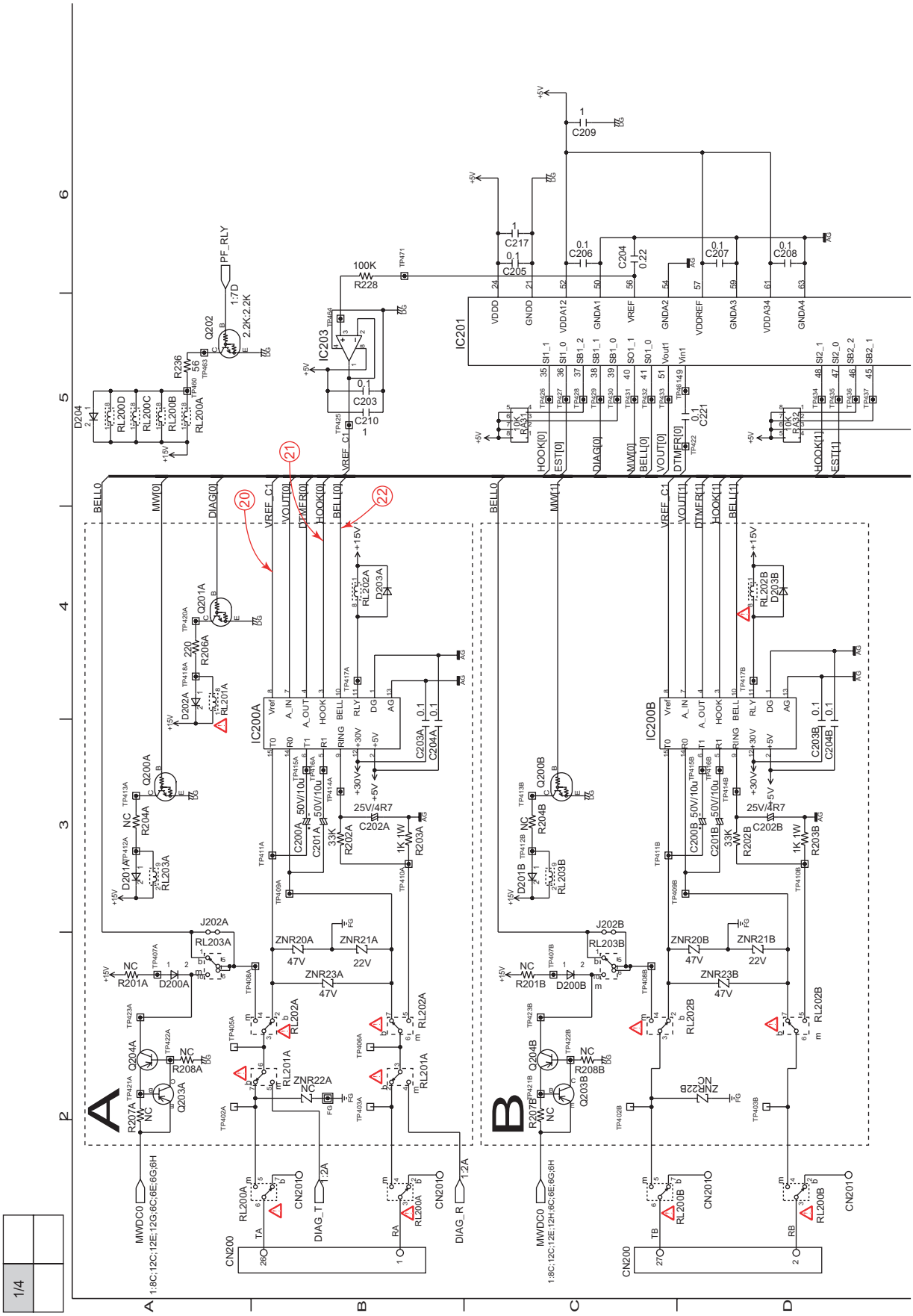
KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.1 (2/4)



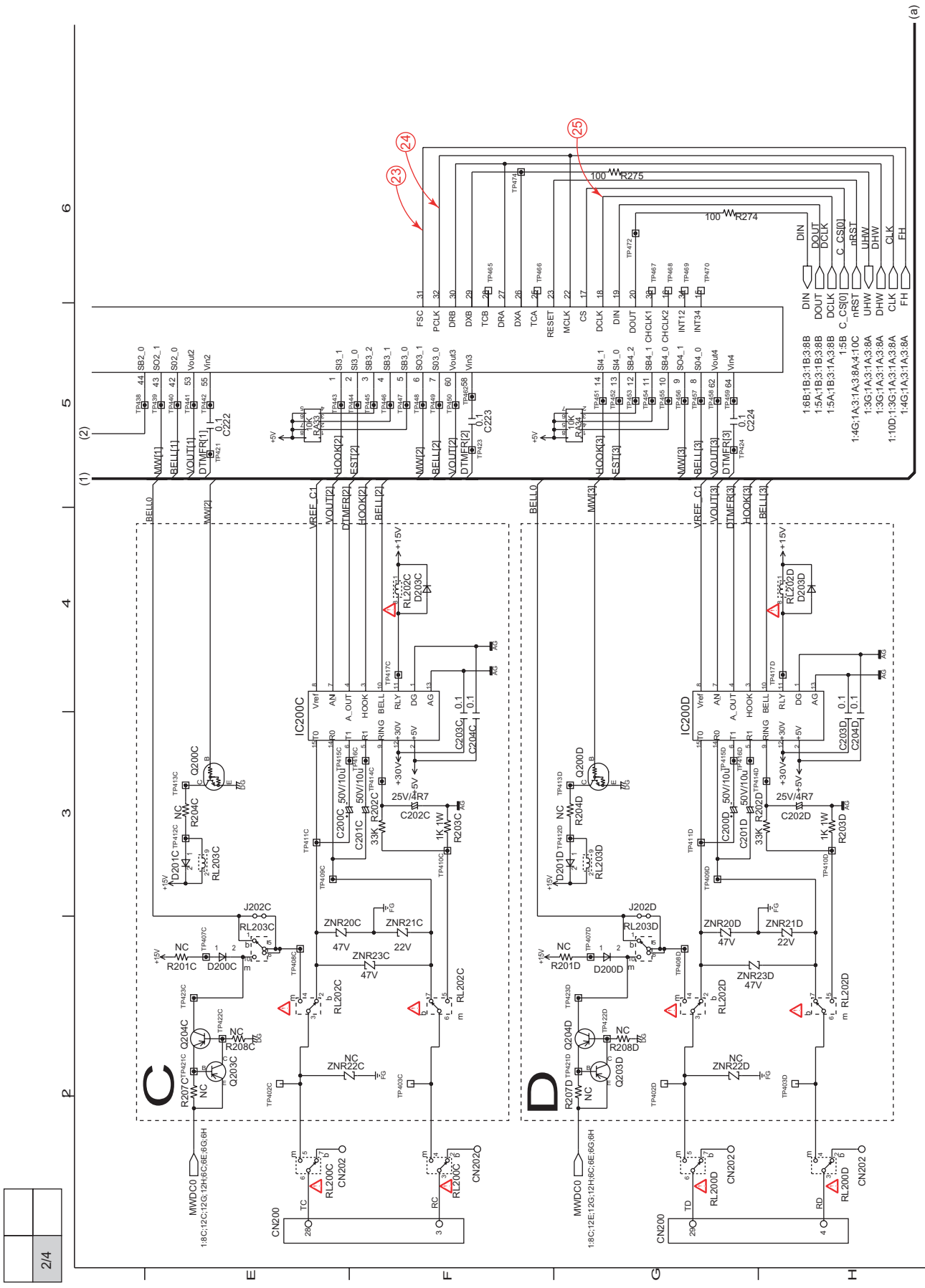
KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.1 (3/4)


4/4
IC14
eSAMSON
KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.1 (4/4)

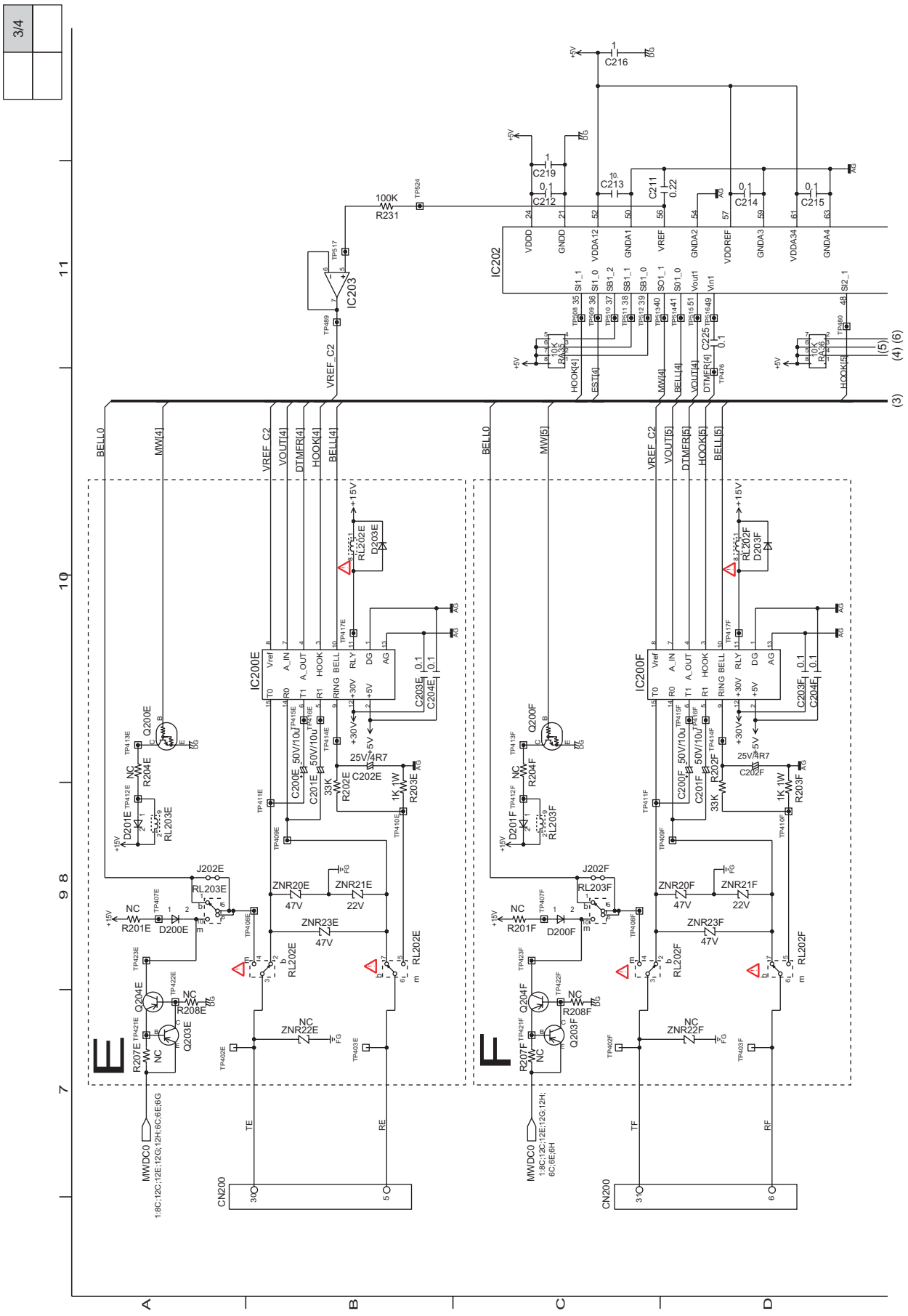
16.2. No.2



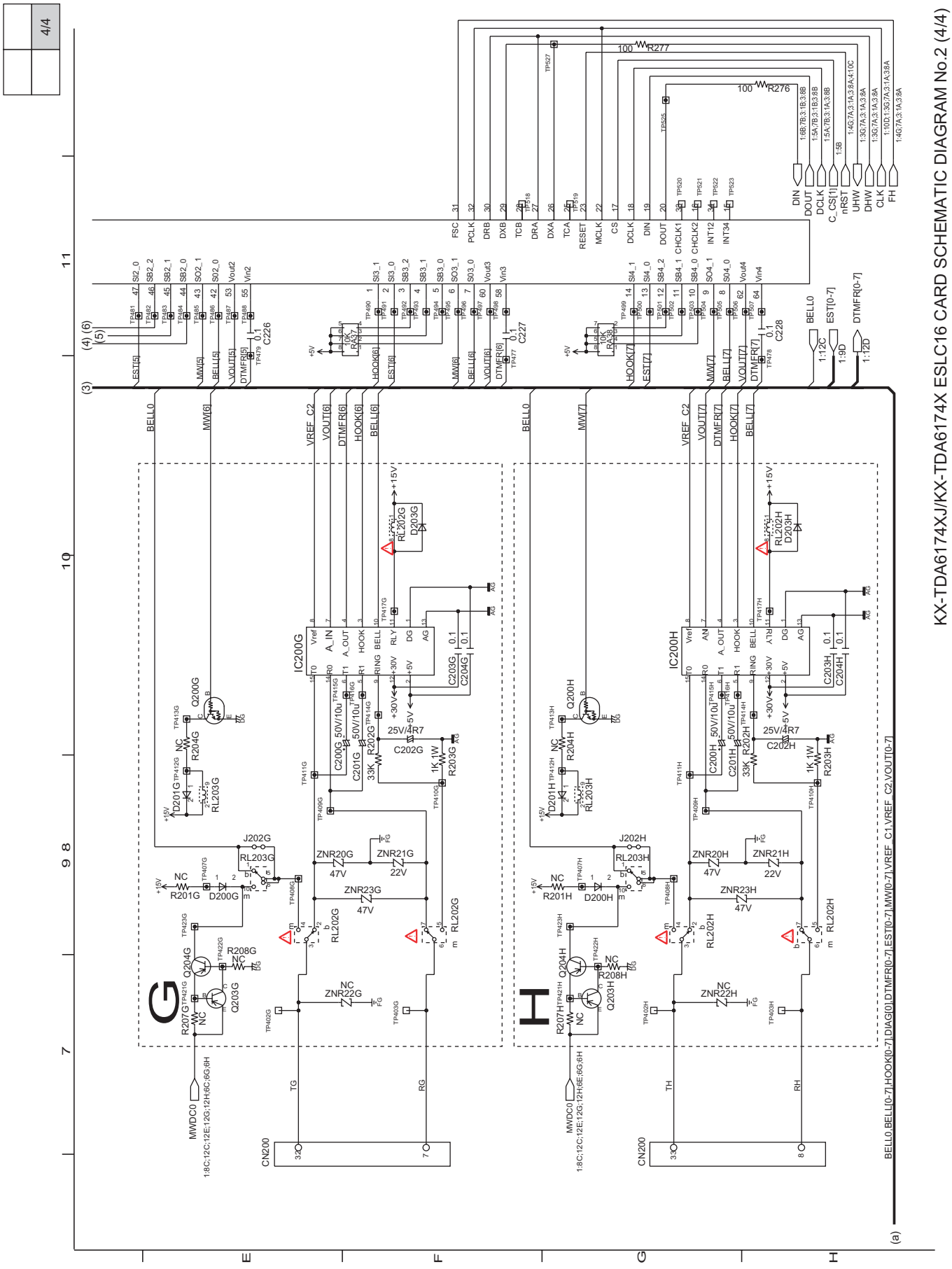
KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.2 (1/4)



KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.2 (2/4)

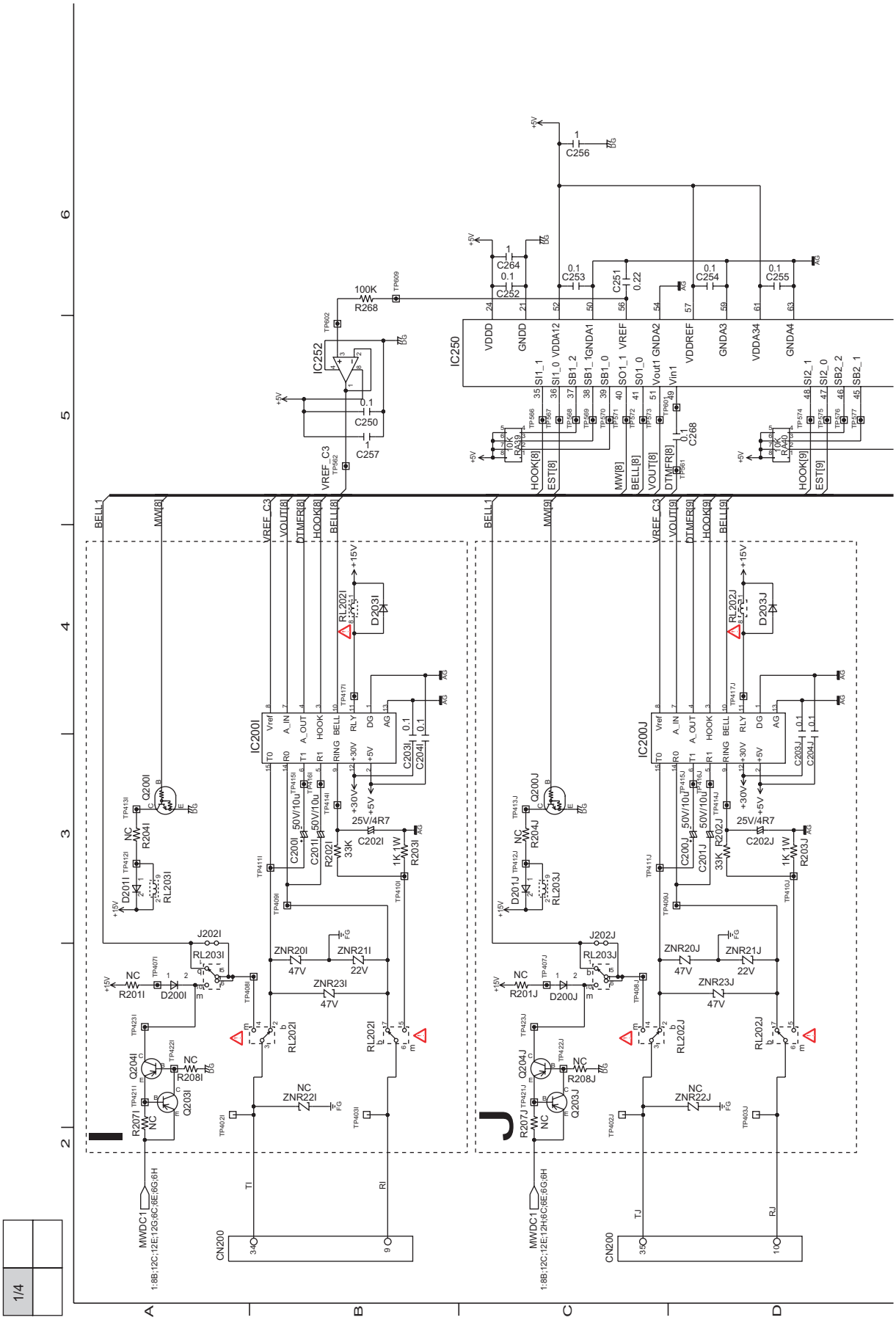


KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.2 (3/4)

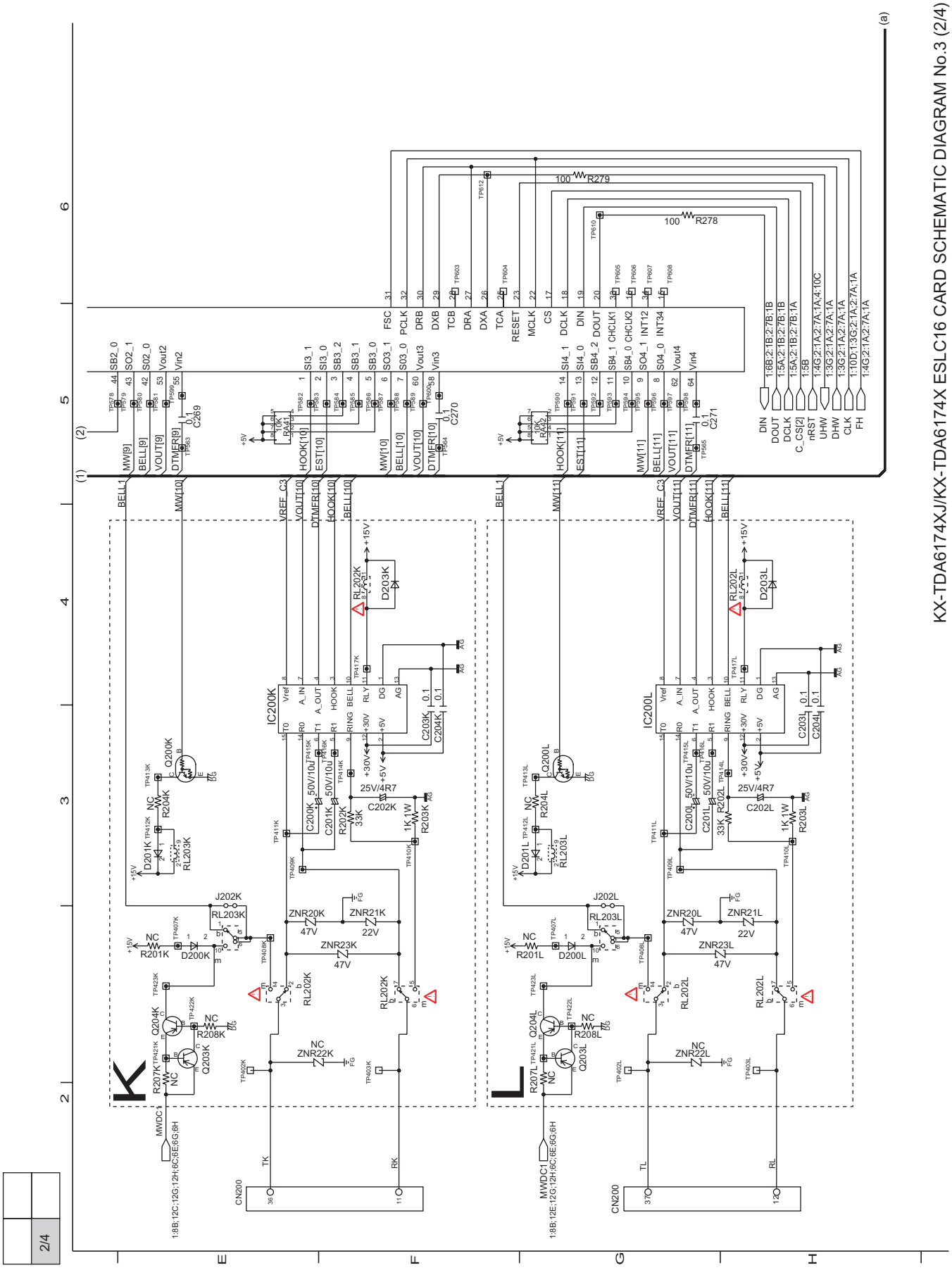


KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.2 (4/4)

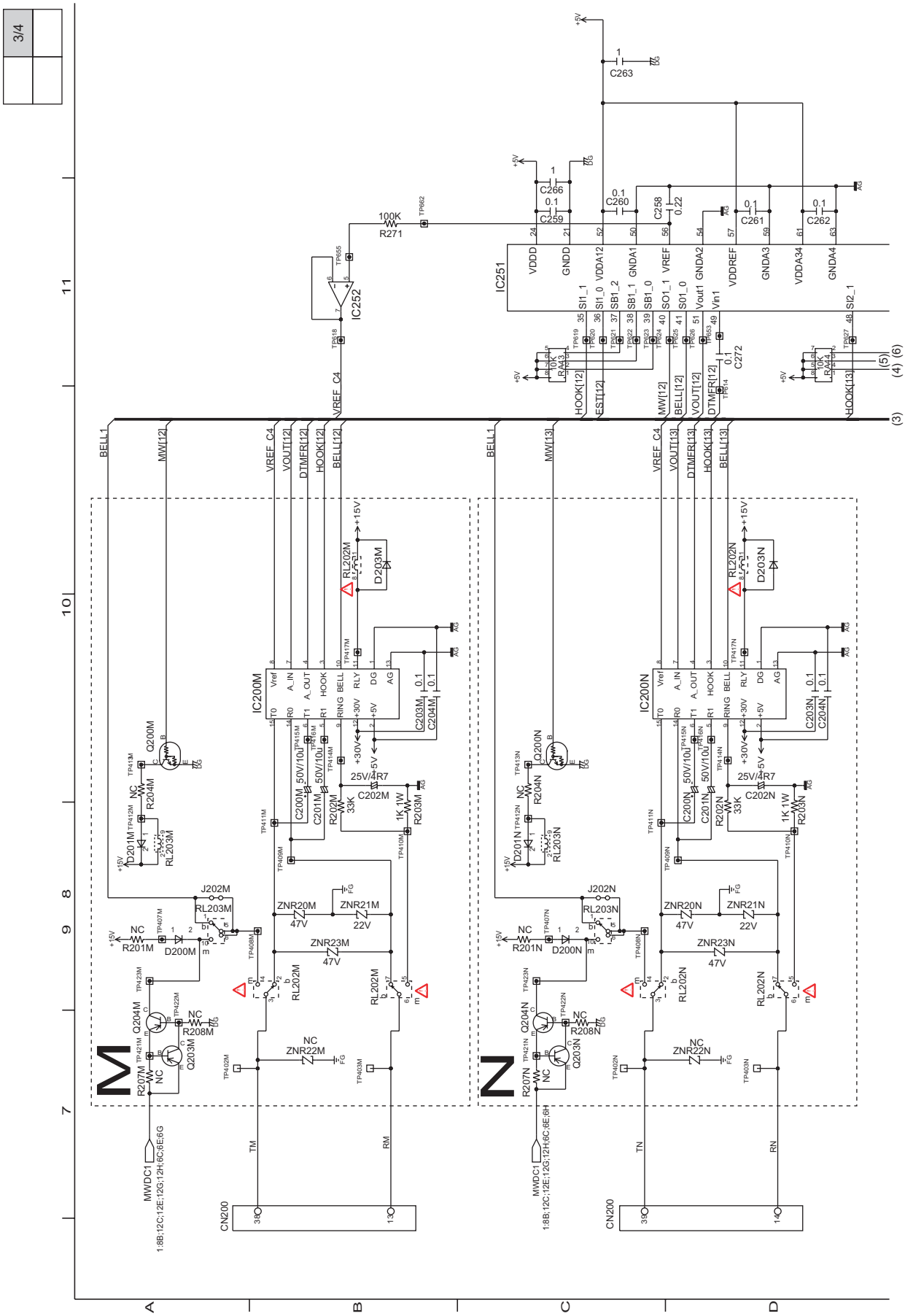
16.3. No.3



KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.3 (1/4)



KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.3 (2/4)


3/4
KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.3 (3/4)
IC251
IC252
IC200M
IC200N
CN200
MWDC1
J202M
J202N
RL203M
RL203N
RL202M
RL202N
D200M
D200N
D203M
D203N
Q200M
Q200N
Q204M
Q204N
Q203M
Q203N
ZNR20M
ZNR21M
ZNR23M
ZNR22M
ZNR20N
ZNR21N
ZNR23N
ZNR22N
C263
C266
C259
C260
C258
C261
C262
C272
C200M
C201M
C202M
C203M
C204M
C200N
C201N
C202N
C203N
C204N
R271
R207M
R208M
R207N
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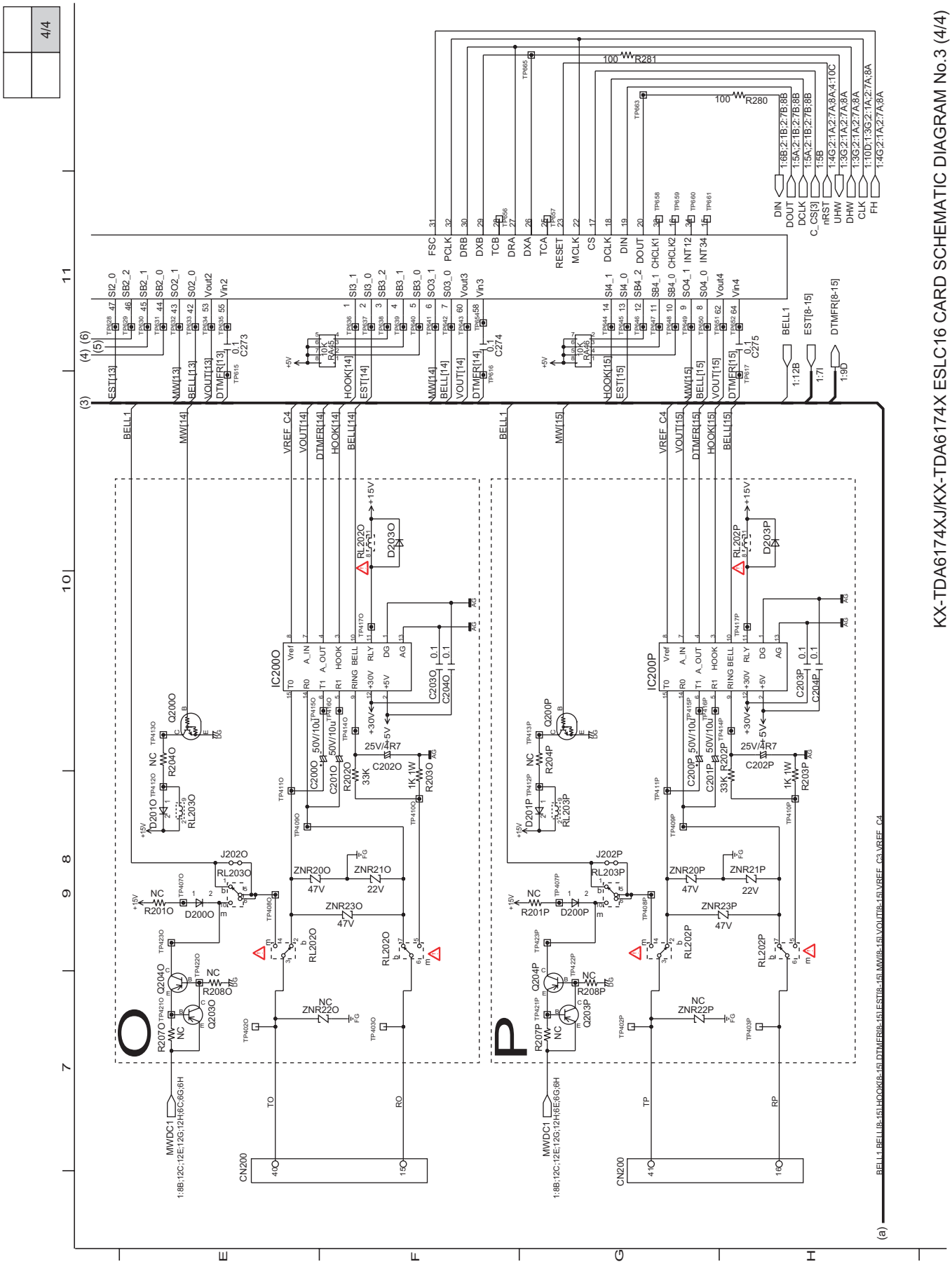
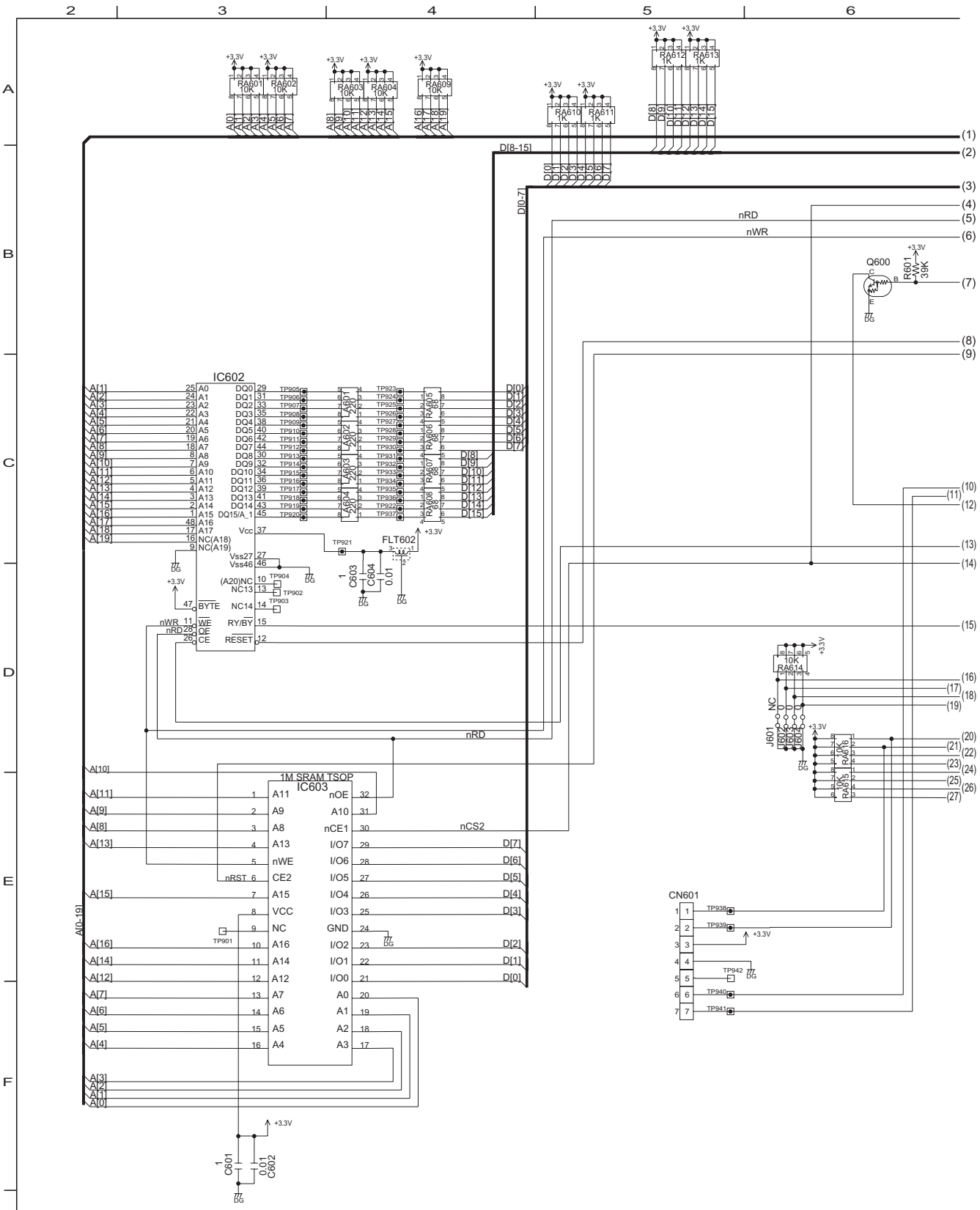
R202M
R202N
R203M
R203N
R204M
R204N
VREF_C4
BELL_1
MW[12]
VOUT[12]
DTMFR[12]
HOOK[12]
BELL[12]
MW[13]
VOUT[13]
DTMFR[13]
HOOK[13]
TEST[12]
Vout1
Vin1
TM
RM
TN
RN
M
N

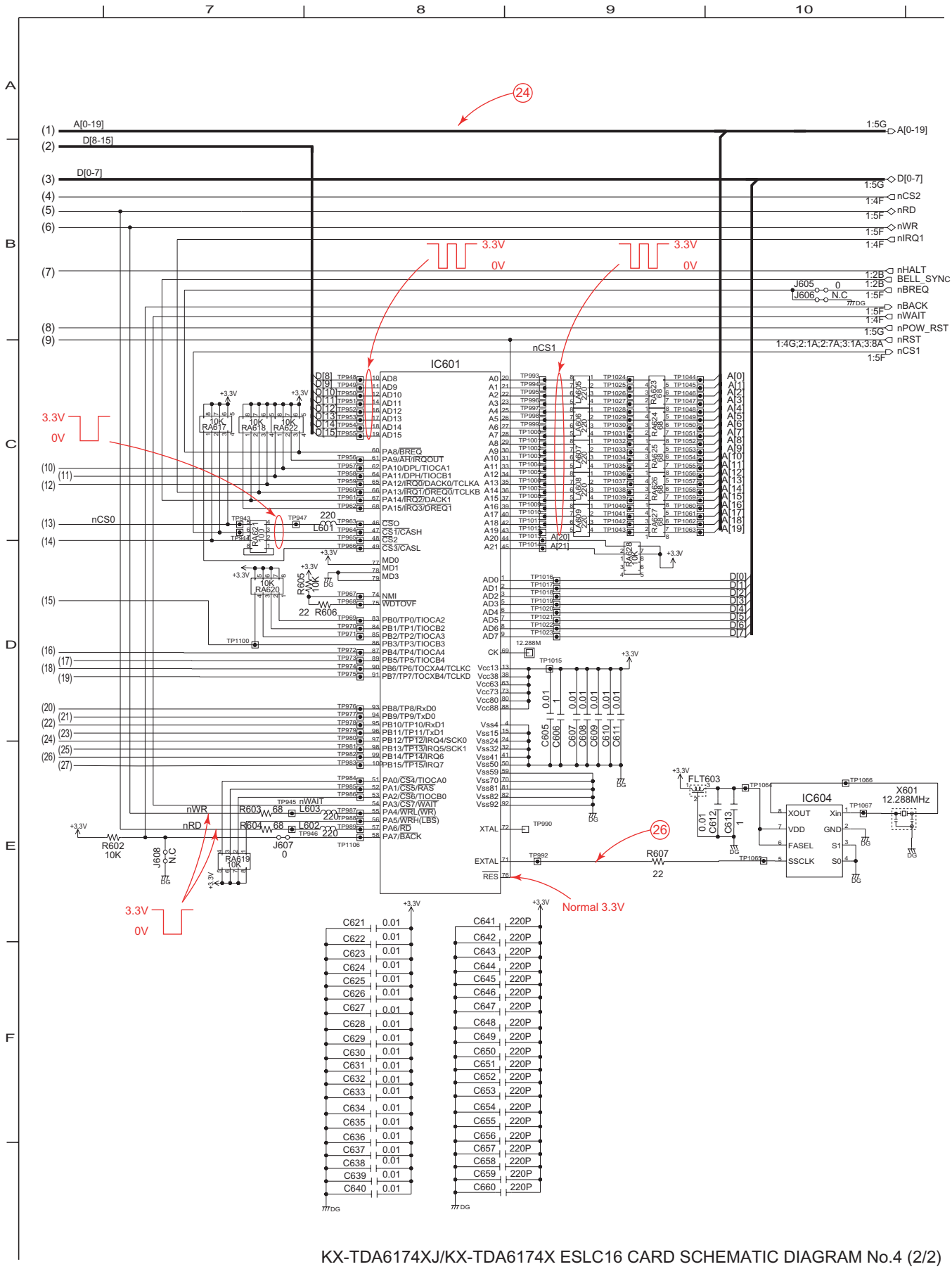


KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.3 (4/4)

16.4. No.4



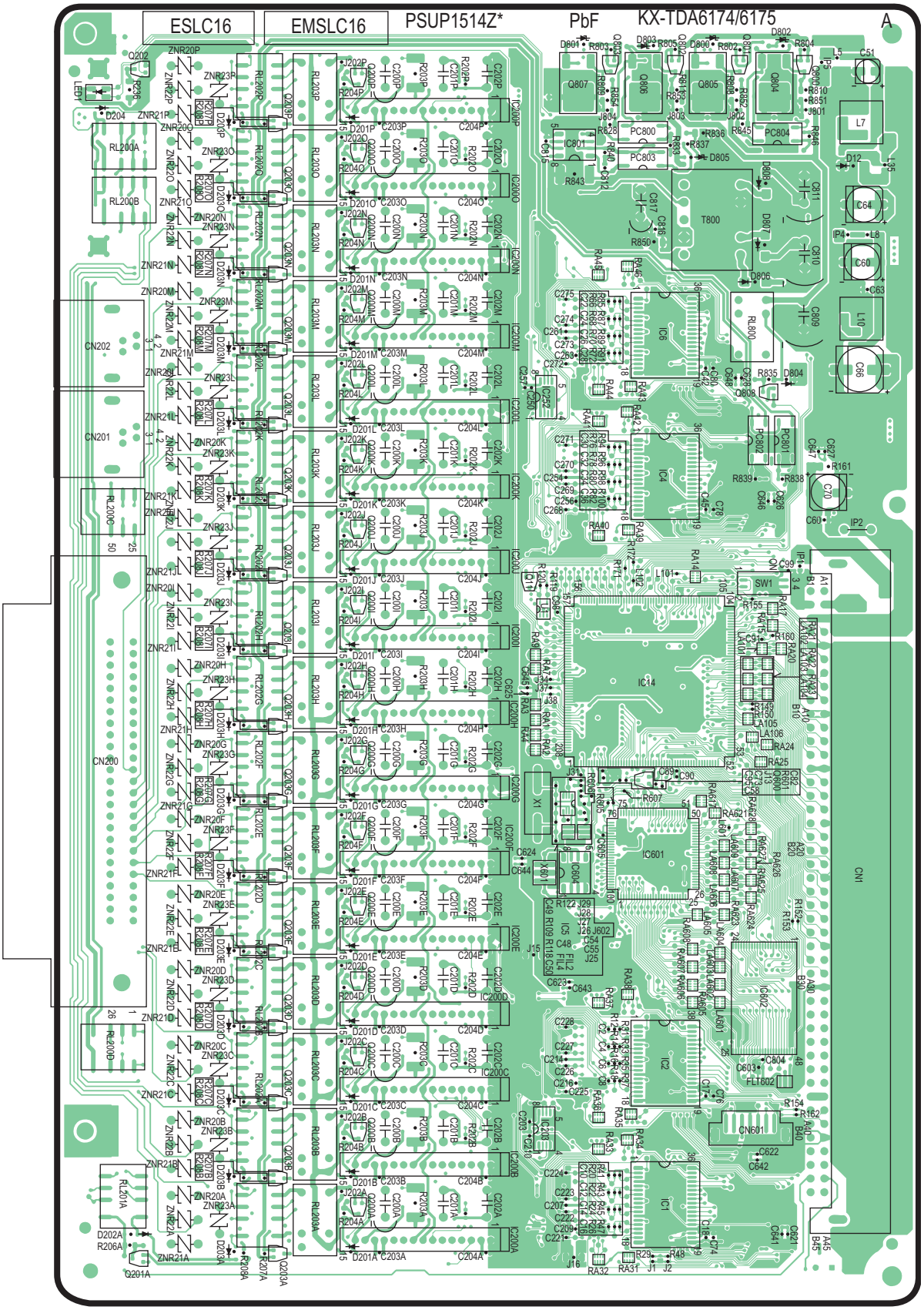
KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.4 (1/2)



KX-TDA6174XJ/KX-TDA6174X ESLC16 CARD SCHEMATIC DIAGRAM No.4 (2/2)

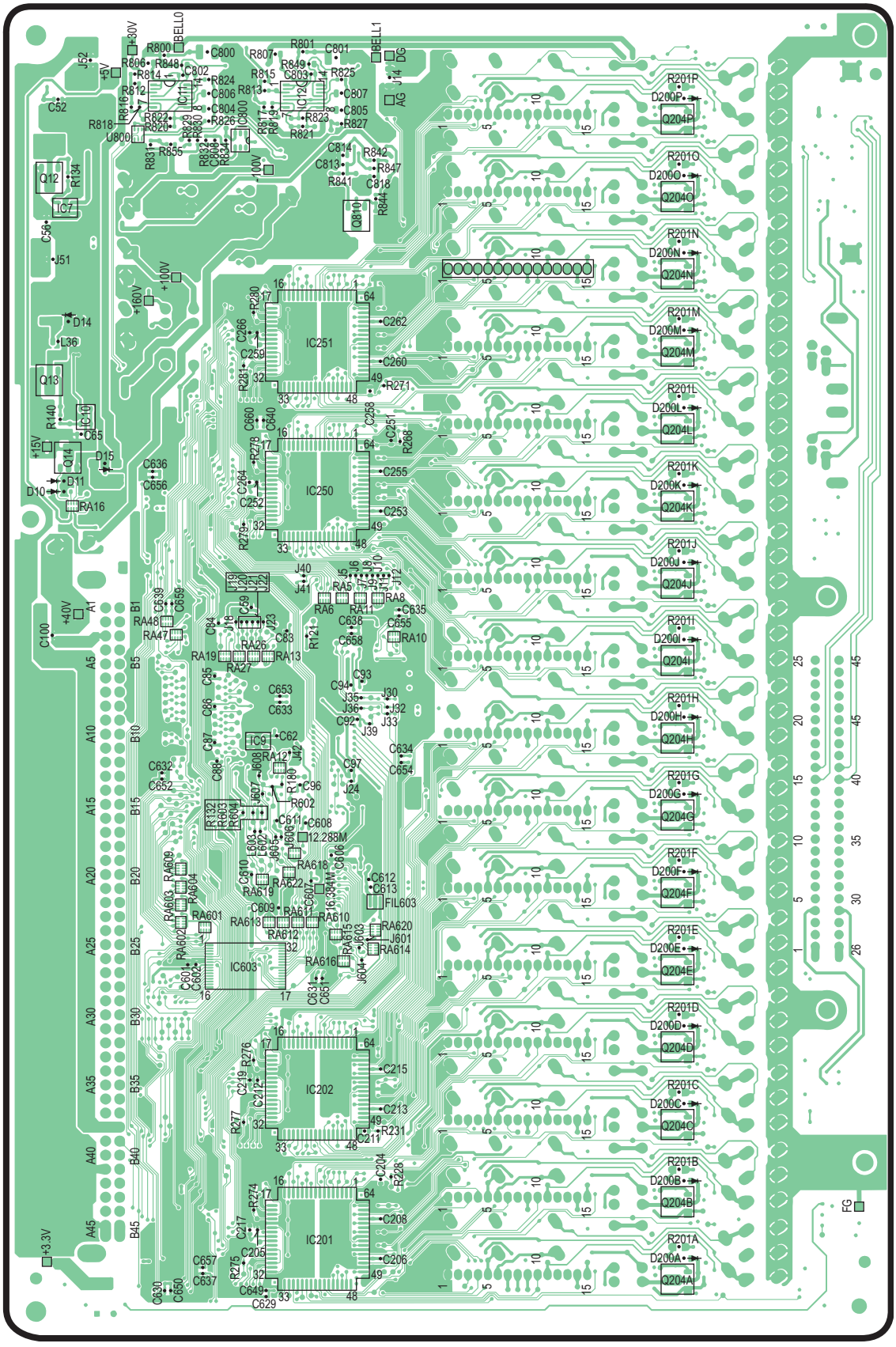
17 PRINTED CIRCUIT BOARD

17.1. Component View



KX-TDA6174XJ/KX-TDA6174X ESLC16 BOARD COMPONENT VIEW

17.2. Bottom View



KX-TDA6174XJ/KX-TDA6174X ESLC16 BOARD BOTTOM VIEW

H
KXTDA6174XJ
KXTDA6174XUK